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Practitioner's Docket No. D-1079 DIV

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): James A. Michael; David T. Frederick; and H. Thomas Graef

For (title): Method For Dispensing Medical Items

1. Type of Application

This transmittal is for a divisional application.

2. Benefit of Prior U.S. Application (35 U.S.C. 119(e), 120, or 121)

The new application being transmitted claims the benefit of prior U.S. application. Enclosed are
ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S.

CERTIFICATION UNDER 37 C.F.R. 1.10*

(Express Mail label number is *mandatory*.)

(Express Mail certification is *optional*.)

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date August 27, 1999, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL342464555US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Ralph E. Jocke

(type or print name of person mailing paper)

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" *must* have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).
"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will *not* be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

(Application Transmittal—page 1 of 5)

jc644 U.S. PTO
08/27/99

jc617 U.S. PTO
09/384650
08/27/99

00344660 000000

APPLICATION CLAIMED.

3. Papers Enclosed

A. Required for filing date under 37 C.F.R. 1.53(b) (Regular) or 37 C.F.R. 1.153 (Design) Application

39 Page(s) of Specification

12 Page(s) of Claims

18 Sheet(s) of Drawing(s)—Informal

B. Other Papers Enclosed

1 Page(s) of abstract

4. Additional Papers Enclosed

Preliminary Amendment

5. Declaration or Oath

Enclosed

Executed by:

● inventors.

6. Inventorship Statement

The inventorship for all the claims in this application is not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made, will be submitted, if requested.

7. Language

English

8. Assignment

An assignment of the invention to Diebold, Incorporated is attached.

9. **Fee Calculation (37 C.F.R. 1.16)**

Regular Application. Cancel claims 2-39 prior to calculating filing fee.

CLAIMS AS FILED					
Claims	Number Filed	Basic Fee Allowance	Number Extra	Rate	Basic Fee 37 CFR 1.16(a) \$760.00
Total Claims (37 CFR 1.16(c))	1	- 20 =	0 x	\$18.00	\$0.00
Independent Claims (37 CFR 1.16(b))	1	- 3 =	0 x	\$78.00	\$0.00
Multiple Dependent Claim(s), if any (37 CFR 1.16(d))			+	\$260.00	

Amendment cancelling extra claims is enclosed. Enter the Preliminary Amendment.

Filing Fee Calculation \$760.00

10. **Fee Payment Being Made at This Time**

Enclosed

Filing Fee \$760.00
Recording assignment
(\$40; 37 C.F.R. 1.21(h))
(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".) \$40.00

Total Fees Enclosed

\$800.00 Fee
Payment Total Fees Enclosed

11. Method of Payment of Fees

Charge Account No. 04-1077 (Diebold, Incorporated) in the amount of \$800.00.

A duplicate of this transmittal is attached.

12. Authorization to Charge Additional Fees

The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 04-1077 (Diebold, Incorporated).

37 C.F.R. 1.16(a), (f) or (g) (filing fees)

37 C.F.R. 1.16(b), (c) or (d) (presentation of extra claims)

37 C.F.R. 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

37 C.F.R. 1.17 (application processing fees)

13. Instructions as to Overpayment

Credit Account No. 04-1077 (Diebold, Incorporated).

**ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF
PRIOR U.S. APPLICATION CLAIMED**

14. Relate Back

A. 35 U.S.C. § 119(e)

"This application claims the benefit of U.S. Provisional Application No.:

APPLICATION NO.

60/045,137

FILING DATE

April 30, 1997

B. 35 U.S.C. §§ 120, 121 and 365(c)

“This application is a divisional of copending application

Application number 08/879,997 filed on June 20, 1997.”

“The nonprovisional application designated above, namely application 08/879,997, filed June 20, 1997, claims the benefit of U.S. Provisional Application No.:

APPLICATION NO.

60/045,137

FILING DATE

April 30, 1997

15. Further Inventorship Statement Where Benefit of Prior Application(s) Claimed

a. This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are the same.

b. The inventorship for all the claims in this application are not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made will be submitted, if requested.


SIGNATURE OF PRACTITIONER

Reg. No. 31,029
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Ralph E. Jocke
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:)	
James A. Michael, et al.)	Prior Application
)	Assigned To:
Serial Number: Unknown)	
)	Art Unit 3651
(Divisional of 08/879,997, filed 06/20/97))	
)	Patent Examiner: Wonki Park
Filed Herewith)	

For: Method For Dispensing Medical Items

PRELIMINARY AMENDMENT

Box Patent Application
Commissioner of Patents and Trademarks
Washington, D. C. 20231

Sir:

Kindly amend the above identified application filed herewith prior to examination as follows:

In the Title

Please change the title to read: METHOD FOR DISPENSING MEDICAL ITEMS

In the Specification

Before the first line of the specification, kindly insert the following:

-- This application is a divisional of co-pending application Serial No. 08/879,997 filed June 20, 1997, which claims the benefit of U.S. Provisional Application No. 60/045,137 filed April 30, 1997.

--.

In the Claims

Kindly cancel claim 1 without prejudice.

Kindly add the following new claims:

40. A method performed with a dispenser, the dispenser including a dispenser module movably mounted in supporting connection with an enclosure, wherein the dispenser module includes a holder enabling holding of medical items, the method comprising the steps of:

- (a) moving the dispenser module from a first position, wherein the dispenser module is within the enclosure, to a second position, wherein the holder extends outside the enclosure;
- (b) adding or removing at least one medical item from the holder while the holder extends outside the enclosure; and
- (c) moving the dispenser module from the second position to the first position wherein the holder is within the enclosure.

41. A method of according to claim 40 wherein the enclosure bounds an interior area, and wherein the enclosure includes an opening to the interior area, the dispenser includes a door in operative connection with the enclosure, wherein the door is movable between a closed position wherein the door closes the opening, and an open position wherein the door is disposed away from the opening, and further comprising the steps of:

- prior to step (a) moving the door of the enclosure from a closed position to an open position, wherein the holder is able to be moved outside the enclosure; and
- after step (c) closing the door.

42. A method of according to claim 40 wherein step (c) comprises manually adding or removing at least one medical item from the holder.

43. A method of according to claim 40 wherein the enclosure bounds an interior area, and wherein the enclosure includes an opening to the interior area, wherein the dispenser includes a door in operative connection with the enclosure, wherein the door is movable between a closed position wherein the door closes the opening, and an open position wherein the door is disposed away from the opening, the dispenser further includes a path extending in the enclosure, wherein the path is in connection with a delivery area, whereby medical items are accessible to a user in the delivery area, and wherein the dispenser module further includes a dispenser mechanism, wherein the dispenser mechanism is selectively operable to dispense medical items from the holder at a dispense location, and wherein in the first position the dispenser module is within the enclosure and the dispense location is positioned adjacent the path, and wherein when the door is in the open position the dispenser module is movable to the second position, and wherein step (a) comprises moving the dispenser module from the first position to the second position wherein in the second position the dispenser module extends through the opening and the holder is manually accessible, and step (c) comprises moving the dispenser module from the second position to the first position, wherein the dispenser module is within the enclosure and the dispense location is positioned adjacent the path.

44. The method of claim 40 and wherein the dispenser module includes a helix rotating mechanism, and prior to step (b) further comprising the steps of:

- f) engaging a helix with the helix rotating mechanism, wherein the holder includes the helix;
- g) engaging a holder guide in operative connection with the dispenser module, wherein a first portion of the holder guide is extended in an inside area within the helix and a second portion of the holder guide extends in an exterior area outside of the helix.

45. The method according to claim 40 wherein the holder includes a pair of rotatable helixes, and wherein step (b) comprises placing a medical item in engagement with each of the helixes in the pair.

46. The method according to claim 40 wherein the dispenser module includes a reference surface extending adjacent to the holder, wherein the reference surface includes indicia thereon indicative of number of medical items in the holder, and prior to step (c) further comprising the step of:

reading the indicia on the reference surface.

47. The method according to claim 40 wherein the dispenser module includes a cover movably mounted thereon, wherein the cover is movable between a down position wherein the cover is in adjacent overlying relation relative to the holder, and an up position wherein the

holder is manually accessible, and wherein the cover is prevented from moving to the up position when the dispenser module is in the first position, and further comprising after step (a) moving the cover to the up position and prior to step (c) moving the cover to the down position.

48. The method according to claim 40 wherein the holder includes a rotatable helix, wherein the helix includes an inside area bounded by the helix, and prior to step (c) further comprising the step of:

extending a limiting member in the inside area of the helix, wherein the limiting member is operative to prevent a medical item from passing through the inside area of the helix absent rotation of the helix.

49. The method according to claim 40 wherein the dispenser module comprises a further dispenser module in the interior area thereof, and subsequent to step (c) in any order, further comprising the steps of:

- d) dispensing a first medical item including a supporting card from the dispenser module; and
- e) dispensing a second medical item including a generally cylindrical liquid holding container from the further dispenser module.

50. The method according to claim 40, and wherein step (b) comprises the steps of:
providing the holder with a plurality of medical items arranged in a stack, wherein in the first position the medical items are biased to move by gravitational force; and

providing a follower in engagement with the stack, wherein in the first position the follower provides additional biasing force on the stack.

51. The method according to claim 40, and wherein step (b) comprises the steps of:
adding a plurality of medical items to the holder arranged in aligned side by side relation in a stack, wherein in the first position the medical items are biased to move by gravitational force towards a dispense location;

providing a movably positionable guide extending adjacent the stack; and

providing a generally cylindrical rotatably movable follower, including at least one annular groove, in operative engagement with the stack, wherein in the first position the follower provides additional biasing force on the stack, and wherein the guide extends in the at least one annular groove during rotational movement of the follower towards the dispense location.

52. A method performed with a medical item dispenser, the dispenser including an enclosure, a door in operative connection with the enclosure, a path extending in the enclosure, wherein the path is in connection with a delivery area, whereby dispensed medical items are accessible to a user in the delivery area, the method comprising the steps of:

(a) providing a dispenser module movably mounted on the enclosure, wherein the dispenser module includes a holder enabling holding of medical items, and a dispenser mechanism selectively operable to dispense medical items from the holder at a dispense location positioned adjacent the path,

- (b) moving the door of the enclosure from a closed position to an open position, wherein the holder is able to be moved outside the enclosure;
- (c) moving the dispenser module from a first position, wherein the dispenser module is within the enclosure, to a second position, wherein the holder extends outside the enclosure;
- (d) adding or removing at least one medical item from the holder while the holder extends outside the enclosure;
- (e) moving the dispenser module from the second position to the first position wherein the holder is within the enclosure; and
- (f) closing the door.

53. A method performed with a medical item dispenser apparatus, the method performed with a dispenser apparatus including:

an enclosure, wherein the enclosure bounds an interior area, and wherein the enclosure includes an opening to the interior area;

a door in operative connection with the enclosure, wherein the door is movable between a closed position wherein the door closes said opening, and an open position wherein the door is disposed away from the opening;

a path extending in said enclosure, wherein the path is in connection with a delivery area, whereby dispensed medical items are accessible to a user in the delivery area;

a dispenser module, wherein the dispenser module is movably mounted on the enclosure, wherein the dispenser module includes a holder, wherein the holder enables holding the medical items therein, and a dispenser mechanism, wherein the dispenser mechanism is selectively operable to dispense medical items from the holder at a dispense location, and wherein the

module is movable on the enclosure between a first position and a second position, wherein in the first position the module is within the enclosure and the dispense location is positioned adjacent the path, and wherein when the door is in the open position the dispenser module is movable to the second position, wherein in the second position the module extends through the opening and the holder is manually accessible, whereby the medical items may be added or removed therefrom;

the method comprising the steps of:

- (a) moving the door from the closed position to the open position;
- (b) moving the dispenser module from the first position to the second position,

wherein the holder extends outside the enclosure;

(c) adding or removing at least one medical item from the holder while the holder extends outside the enclosure;

(d) moving the dispenser module from the second position to the first position wherein the holder is within the interior area; and

- (e) closing the door.

54. The method according to claim 53 wherein step (c) comprises manually adding or removing at least one medical item from the holder.

55. The method according to claim 53 wherein the dispenser module includes a helix rotating mechanism, and prior to step (c) further comprising the steps of:

- f) engaging a helix with the helix rotating mechanism, wherein the holder includes the helix;
- g) engaging a holder guide in operative connection with the dispenser module, wherein a first portion of the holder guide is extended in an inside area within the helix and a second portion of the holder guide extends in an exterior area outside of the helix.

56. The method according to claim 53 wherein the holder includes a pair of rotatable helixes, and wherein step (c) comprises placing a medical item in engagement with each of the helixes in the pair.

57. The method according to claim 53 wherein the dispenser module includes a reference surface extending adjacent to the holder, wherein the reference surface includes indicia thereon indicative of numbers of medical items in the holder, and prior to step (d) further comprising the step of:

reading the indicia on the reference surface.

58. The method according to claim 53 wherein the dispenser module includes a cover movably mounted thereon, wherein the cover is movable between a down position wherein the cover is in adjacent overlying relation relative to the holder, and an up position wherein the holder is manually accessible, and wherein the cover is prevented from moving to the up position

when the dispenser module is in the first position, and further comprising after step (b) moving the cover to the up position and prior to step (d) moving the cover to the down position.

59. The method according to claim 53 wherein the holder includes a rotatable helix, wherein the helix includes an inside area bounded by the helix, and prior to step (d) further comprising the step of:

extending a limiting member in the inside area of the helix, wherein the limiting member is operative to prevent a medical item from passing through the inside area of the helix absent rotation of the helix.

60. The method according to claim 53 wherein the dispenser module comprises a further dispenser module in the interior area thereof, and subsequent to step (e) in any order, further comprising the steps of:

- f) dispensing a first medical item including a supporting card from the dispenser module into the path; and
- g) dispensing a second medical item including a generally cylindrical liquid holding container from the further dispenser module into the path.

61. A method comprising the steps of:

- (a) providing an enclosure including a delivery area accessible from outside the enclosure;
- (b) providing a first dispenser module in the enclosure and in supporting connection with the enclosure through a first support, wherein the first dispenser module includes a plurality

of first medical items and is selectively operative to dispense first medical items therefrom, wherein first medical items dispensed from the first dispenser module in the enclosure move to the delivery area;

(c) providing a second dispenser module in the enclosure and in supporting connection with the enclosure through a second support, wherein the second and first supports are interchangeably engageable to support either the first or second dispenser modules, and wherein the second dispenser module includes a plurality of second medical items and is selectively operative to dispense the second medical items therefrom, wherein second medical items dispensed from the second dispenser module in the enclosure move to the delivery area; and

(d) dispensing at least one of a first or second medical item to the delivery area.

62. The method according to claim 61 wherein each first medical item includes a supporting card and each second medical item includes a generally cylindrical liquid holding container, and wherein step (d) comprises

dispensing a first medical item including a supporting card from the first dispenser module; and dispensing a second medical item including a generally cylindrical liquid holding container from the second dispenser module.

REMARKS

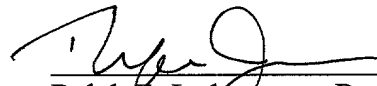
Claims 1-39 have been canceled. New claims 40-62 have been added. Claims 40-62 are now pending. Claim 40 corresponds to claim 40 of the patent application. Claims 52 and 53

generally correspond to allowed parent claim 1. Claim 61 generally corresponds to allowed parent claim 47.

Two additional independent claims in excess of 3 has been presented. Two additional claims in excess of 20 have been presented. Please charge the fee (\$192) for these claims and any other fee due to Deposit Account 04-1077 (Diebold, Incorporated).

Favorable consideration of the pending claims is requested. The undersigned will be happy to discuss any aspect of the application by telephone at the Examiner's convenience.

Respectfully submitted,



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APPLICATION FOR UNITED STATES LETTERS PATENT

Title: **Apparatus for Dispensing
Medical Items**
Inventor: **James A. Michael
David T. Frederick
H. Thomas Graef**
Docket No.: **D-1079**

TECHNICAL FIELD

This invention relates to devices for dispensing medical items. Specifically, this invention relates to a dispenser for dispensing varied types of medical items in a system which controls and tracks the use of medical items.

BACKGROUND ART

Medical items used in the treatment of patients often need to be tracked. Such medical items may include medications as well as medical devices and appliances. Such medical items come in various forms and sizes. For example, medications may be in the form of pills, capsules or caplets which are orally ingested. Alternatively, medications may be in liquid form. Liquid medications may be ingested, injected or applied topically to the patient. Similarly, medical devices vary from tiny machines which are implantable in the patient to larger items such as syringes, suction tubes and the like.

In the past the use of medical items by patients has been tracked manually. Medical providers would maintain paper records of inventories of medical items. As medical items were used for or by a patient, the use would be recorded. Paperwork was generated both for purposes of tracking the patient's treatment as well as for inventory and billing purposes. The manual tracking of medical items by patients particularly in large facilities became complex.

In recent years automated systems for controlling, dispensing and tracking the use of medical items have been developed. An example of such a system is shown in U.S. Patent Application No. 08/361,783 filed December 16, 1994 and which is owned by the Assignee of the present invention. Such automated systems enable a medical technician to avoid much of the paperwork associated with tracking the use of medications, maintaining adequate inventories and billing patients. In such systems information concerning patients, medical items prescribed for the patients and medical items available for use by patients are stored in a data store. A user of the system, which is generally a health care provider such as a nurse or physician, uses a display terminal to select a patient and the medical items for the patient. In response to the user's input at the display terminal, the requested medical items are dispensed from a dispenser. The health care provider takes the item for use by the patient.

In the system owned by the Assignee of the present invention, the dispense of a medical item for a patient is recorded for several purposes. Information representative of the use of the item is stored in correlation with the patient's medical information for tracking the course of treatment and recovery. The use of the medical item is also recorded for billing purposes. This enables the patient's account to be charged for the value of the medical item. The use of the medical item is also recorded for purposes of tracking available inventories at various locations. This is done to assure that adequate supplies of medical items are available for dispense where they are needed. The disclosure of U.S. Serial No. 08/361,783 is incorporated herein by reference as if fully rewritten herein.

The use of automated systems for dispensing medical items has resulted in a need for dispensers which can dispense medical items accurately and reliably in response to electrical signals. Such dispensers optimally should be capable of dispensing a wide range of medical items having various sizes and configurations.

5 Medical science is advancing rapidly. As science advances new and different types of medical devices and medications become available. Dispensers for medical devices must optimally be adaptable to new and different configurations of medical devices. Dispensers must be frequently refilled. Therefore it is desirable for such dispensers to be readily reloaded. Inventory of the items in dispensers must be frequently taken. There is a need for facilitating visual verification of the type and quantity of items which are in inventory in a dispenser mechanism.

15 Dispensers which are capable of dispensing various types of medical items may present difficulties because certain items are fragile and subject to breakage. It is sometimes desirable to dispense several medical items together as part of a kit. Such a system is disclosed in U.S. Patent Application No. 08/756,623 filed November 26, 1996 which is owned by the Assignee of the present invention and the disclosure of which is incorporated herein by reference. Alternatively, health care providers may wish to dispense several different types of medical items in rapid succession, in which case several items will be delivered into a delivery location. If a fragile item is dispensed along with other items there is a possibility of breakage. Breakage is undesirable as it not only wastes a valuable medical

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item but may also contaminate the dispenser and may place it out of service until it can be cleaned. Thus, there is a need for medication dispensers that can dispense several types of medical items including fragile items together while minimizing the risk of breakage.

There is also a need to carefully monitor the use of narcotics. Steps are required by law to minimize the risk of theft of such items. It is desirable for medication dispensers to provide enhanced security which minimizes the risk that medical items may be taken from the dispenser through improper means. While enhanced security is desirable, authorized personnel who replenish medications or who service the dispenser should have ready access to the medications and dispenser mechanisms within the dispenser.

Thus, there exists a need for a dispenser for medical items that is capable of dispensing a wide variety of medical items, that reliably and accurately dispenses such items in response to electrical signals, that is easy to use and which provides enhanced security for preventing unauthorized access.

DISCLOSURE OF INVENTION

It is an object of the present invention to provide a dispenser for medical items.

It is a further object of the present invention to provide a dispenser for medical items that reliably dispenses requested medical items in response to electrical signals.

It is a further object of the present invention to provide a dispenser for medical items that provides enhanced security.

It is a further object of the present invention to provide a dispenser for medical items that is capable of dispensing items of various types and sizes.

5 It is a further object of the present invention to provide a dispenser for medical items that includes dispenser modules that can be readily reloaded either in the dispenser or at remote locations.

It is a further object of the present invention to provide a dispenser for medical items that makes it easier to take inventory of the number of medical items remaining in the dispenser.

It is a further object of the present invention to provide a dispenser for medical items that includes interchangeable dispenser modules.

It is a further object of the present invention to provide a dispenser for medical items that minimizes the risk of damage to items being dispensed.

It is a further object of the present invention to provide a dispenser for medical items that provides two independent ways for authorized personnel to gain access to the medical items and mechanisms housed in the dispenser.

Further objects of the present invention will be made apparent in the following Best
5 Modes for Carrying Out Invention and the appended claims.

The foregoing objects are accomplished in a preferred embodiment of the invention by a dispenser apparatus that dispenses medical items. The dispenser apparatus includes an enclosure which bounds an interior area. The enclosure includes an opening to the interior area and a movable door which is movable between positions opening and closing the opening.

A plurality of dispenser modules are movably mounted on the enclosure. The dispenser modules are movable between first and second positions. In the first position the dispenser modules are housed within the enclosure and in the second position the dispenser modules extend through the opening when the door is in the open position. In the preferred
15 form of the invention the dispenser modules in the second position may be replenished with medical items or disengaged from the dispenser and taken to a remote location for replenishment.

In a preferred form of the invention each dispenser module includes a holder for holding medical items and a dispenser mechanism for dispensing the items in the holder in response to electrical signals. The medical items are dispensed from each dispenser module at a dispense location. The dispenser modules are each mounted on guides which enable
5 dispenser modules to be interchangeably positioned in the enclosure. When a dispenser module is in the first position within the enclosure, the dispense location of the module is positioned adjacent to a path. The path extends in the dispenser to a delivery area from which dispensed medical items may be taken by a user. The path includes at least one energy absorbing carom surface which slows and absorbs energy from dispensed items moving towards the delivery area to minimize the risk of breakage.

The dispenser modules and the path are configured to provide enhanced security. The configurations of the dispenser modules and the enclosure are such that improper efforts to gain access to the medical items will cause the path to be blocked. Holders and guides which are readily movable or disengaged from the dispenser modules when in the second position, cannot be moved or disengaged when the modules are in the first position.

The door of the dispenser includes a secure lock mechanism. In a preferred embodiment two independent modes are provided to enable authorized personnel to move the lock to an open condition. The modes include unlocking the lock in response to electrical signals. The lock may also be opened manually in the event that an electrical failure or
20 malfunction of the electronic control system.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a front plan view of a dispenser for dispensing medical items of a preferred embodiment of the invention.

Figure 2 is a schematic cross sectional view of the dispenser taken along the line 2-2 in Figure 1.

Figure 3 is a view similar to Figure 2 with the dispenser door in the open position and a dispenser module in an extended position.

Figure 4 is a view similar to Figure 3 showing the dispenser modules removed from the dispenser.

Figure 5 is a top plan view of a first type of dispenser module configured for dispensing solid medications.

Figure 6 is a partially sectioned front view of the dispenser module shown in Figure 5.

Figure 7 is a side view of the dispenser module shown in Figure 5.

Figure 8 is a top plan view of a reference surface of the dispenser module shown in Figure 5 with indicia thereon for indicating the number of medical items remaining in each holder of the dispenser module.

Figure 9 is a side view of a guide used in connection with a dispenser module shown in Figure 5.

Figure 10 is a top view of the outer end of the guide shown in Figure 9.

Figure 11 is a cross sectional view of the guide taken along line 11-11 in Figure 9.

Figure 12 is a top plan view of a dispenser module similar to that shown in Figure 5 configured for dispensing larger medical items.

Figure 13 is a transparent partial plan view of the dispenser shown in Figure 1 and the path taken by dispensed medical items.

Figure 14 is a top plan view of a second type of dispenser module used for dispensing medical items which include liquid medications.

Figure 15 is a side cross sectional view of the front portion of the dispenser module shown in Figure 14 with the medications not shown.

Figure 16 is a top plan view of the dispenser shown in Figure 14 with the medications and dividers removed.

Figure 17 is a front plan view of a first follower used in connection with the dispenser module shown in Figures 14-16.

5 Figure 18 is a front plan view of a second follower used in connection with the dispenser module shown in Figures 14-16.

Figure 19 is a side view of a guide used in connection with the dispenser shown in Figures 14-16.

10 Figure 20 is a partial side view of the lock used in connection with the door of the dispenser mechanism.

Figure 21 is a top view of the lock shown in Figure 20.

Figure 22 is a front transparent view of the lock shown in Figure 20 and the door of the enclosure.

Figure 23 is an enlarged view of the lock shown in Figure 22.

Figure 24 is a top plan view of a portion of a dispenser module of the type shown in Figure 5 configured to dispense medical items which are in the form of small cylindrical containers.

Figure 25 is a top plan view of a portion of a dispenser module similar to that shown in Figure 5 configured to dispense cylindrical containers of a larger size than those in Figure 24.

Figure 26 is a top plan view of a portion of a dispenser module similar to that shown in Figure 5 configured to dispense ampules and cylindrical containers.

Figure 27 is a front isometric view of a helix guide of the type shown in Figure 26.

Figure 28 is a front isometric view of a medication limiter of the type shown in Figures 24-26.

BEST MODES FOR CARRYING OUT INVENTION

Referring now to the drawings and particularly to Figure 1, there is shown therein a dispenser apparatus for dispensing medical items of a preferred embodiment of the present invention generally indicated 10. The dispenser is used as part of the system which is described in co-pending Application No. 08/361,783 filed December 16, 1994, the disclosure

of which is incorporated herein by reference. Dispenser 10 includes an enclosure 12. The enclosure bounds an interior area generally indicated 14 as shown in Figure 2.

Enclosure 12 has a door 16 movably mounted thereon. Door 16 is movable between a closed position shown in Figures 1 and 2 and an open position which is shown in Figure 3. In the open position the door enables access through an opening generally indicated 18, to the interior area 14.

Dispenser 10 further includes a delivery area generally indicated 20. Medical items dispensed from dispenser 10 are accessible to a user in the delivery area as later described in detail.

As shown in Figure 2, enclosure 12 further includes a lock 22 thereon. Lock 22 which is later described in detail is operative to hold door 16 in a closed position. Lock 22 includes two independently actuatable unlocking mechanisms which enable changing the lock from a locked to an unlocked condition so door 16 may be opened.

As shown in Figures 2 and 3, enclosure 12 has mounted thereon a plurality of dispenser modules 24. Dispenser modules 24 are movably mounted on guides 26 in enclosure 12. Guides 26 preferably comprise transversely disposed pairs of guides which enable dispenser modules 24 to move in sliding engagement thereon. Each of the dispenser modules further includes thereon a pair of disposed guide tracks which engage the guides 26

in slidable relation. Guides 26 may be conventional types which operate in a manner hereinafter described. It should be understood that although in Figures 2 and 3 only five spaces are shown for dispenser modules 24, in other embodiments of the invention additional guides and dispenser modules may be used.

5 Shown positioned within enclosure 12 in Figure 2 is a first type of dispenser module 28 and a second type of dispenser module 30. Dispenser module 28 which is described in detail later, is preferably configured for dispensing medical items such as medications of the pill or caplet type. Dispenser 30 is of a type that dispenses medical items that are housed in cylindrical containers, including containers which hold liquid medications. The dispenser mechanism in dispenser module 30 is preferably the type shown in U.S. Patent Application No. 08/361,783 filed December 16, 1994 which is incorporated herein by reference. It should be understood that dispenser modules 28 and 30 are exemplary, and that other types of medication dispensing modules may be used in other embodiments. The dispenser modules are preferably interchangeable on guides 26. In Figures 2 and 3, only two dispenser modules 24 are shown for purposes of simplicity. Dispenser modules may be mounted on each pair of guides 26.

15 The dispenser modules 24 are controlled by electrical signals which are delivered through a plurality of wiring harnesses generally indicated 32. Wiring harnesses 32 extend in the interior area 14 of enclosure 12. Each wiring harnesses 32 terminates in a connector end 34. Connector ends 34 are engageable with coupling ends on the dispenser modules and

provide a quick connect/disconnect electrical coupling for connecting each wiring harness to a dispenser module.

Dispenser modules 28 and 30 each include a pair of spring-loaded latching levers adjacent to the front ends thereof. Latching levers 36 extend on dispenser module 28.

5 Similarly, a latching lever 38 extends on dispenser module 30. The latching levers 36 and 38 are movably mounted about pivots 40 and 42, respectively. The latching levers are biased downwardly by springs to engage latching pins 44 which extend adjacent to each of guides 26. The engagement of the latching levers with the latching pins holds the dispenser modules in position to dispense medical items within enclosure 12. Latching levers 36 each include a release portion 46. Release portion 46 is manually movable to cause latching lever 36 to disengage from a latching pin 44. Latching lever 36 and release portion 46 are shown in greater detail in Figure 7. Latching levers 38 also include release portions 48 which are operative to move the latching lever 38 to disengage from a latching pin. When the dispenser modules are disengaged from the latching pins the dispenser modules may be moved outwardly through opening 18 on guides 26.

Dispenser module 28 includes a dispense location generally indicated 50, which is adjacent to a front end thereof. Dispense location 50 is where medical items are dispensed from the dispenser module 28. Dispenser module 30 also includes a dispense location generally indicated 52. Dispense location 52 is similarly located adjacent to a front end of dispenser module 30. When the dispenser modules are positioned in the dispenser, dispense

locations 50 and 52 extend adjacent to a path generally indicated 54. Path 54 extends from the dispense locations on the dispenser modules to the delivery area 20. Delivery area 20 includes a pocket generally indicated 56.

Path 54 is bounded in an area adjacent to the dispenser modules by an interior surface 58 of door 16. In the operative position of the dispenser modules the dispense locations thereof are disposed not only upwardly, but also in closer proximity to the interior surface of the door with increasing proximity to the top of the dispenser. This minimizes the risk that medical items dispensed from a dispenser module located vertically above other dispenser modules will engage or otherwise interfere with the lower dispenser modules or items being dispensed therefrom.

The preferred embodiment of the invention is enabled to be used with various types and sizes of medical items. When several medical items are being dispensed together as part of a kit, such as disclosed in U.S. Patent Application No. 08/756,623 filed November 26, 1996 the disclosure of which is incorporated herein by reference, several items may be dispensed from the dispense locations into path 54 simultaneously. Such medical items will all move downward in path 54 and collect in pocket 56 of the delivery area. Several medical items may also collect in pocket 56 when medical items are dispensed in rapid succession. Because certain medical items may be fragile or subject to breakage, there is a risk that medical items may impact one another and break or otherwise be damaged.

The risk of damage to dispensed medical items is minimized in a preferred embodiment of the present invention by an angled carom surface 60 at a lower end of path 54. Carom surface 60 is positioned in a throat area generally indicated 62, wherein path 54 narrows horizontally (see Figure 13). Carom surface 60 is covered with material which absorbs energy from medical items landing thereon. Carom surface 60 is angled and has a low surface friction value to assure that medical items which land thereon will not stick or be hung up on the carom surface. This feature is particularly useful for lightweight items.

Items which have engaged the carom surface fall downwardly through an elbow area 64 in path 54 and are directed into pocket 56. To minimize possible damage due to forward momentum from engagement with carom surface 60 and the surface bounding elbow area 64, pocket 56 includes a stop surface 66 which is coated with energy absorbing material. The interior surface of door 16 includes a guide 58 attached thereto. Guide 58 is preferably comprised of plastic material and directs medical items in the path 54 to engage carom surface 60. The guide 58 provides smoother and quieter dispensing operation and minimizes the risk of damage to dispensed medical items.

As can be appreciated from Figure 13, medical items such as ampules 68, vials 70 and cards 72 with pills or capsules attached thereto are directed by the guide 58 on the inside of door 16 to fall downwardly into engagement with carom surface 60. Upon engagement with carom surface 60, much of the downward momentum gained by the medical items while falling through the upper portions of path 54 is lost to the energy absorbing material on the

carom surface. Thereafter the medical items slide off the carom surface and slide on the generally low friction plastic surface bounding elbow area 64 until they reach the pocket 56 in delivery area 20. Relatively heavy medical items such as ampules 68 and vials 70 may gain further forward momentum as they pass through the elbow area. The risk of damage due to collisions with such items is minimized by the energy absorbent stop surface 66.

Medical items which land near the sides of the carom surface engage the curved side walls of the elbow area which further reduces forward momentum. The dispensed medical items collect in pocket 56 until removed by a user.

The configuration of path 54 provides enhanced security against improper access to the medical items in the dispenser modules 24. The opening to delivery area 20 is relatively small to restrict access into the interior area of the dispenser. Elbow area 64 is turned and throat area 62 is sufficiently small that a person attempting to pass a hand or tool upwardly therein to reach the dispenser modules would find it difficult to do so. Attempts by such a person to dislodge medications held in the dispenser modules are not likely to disengage the latching levers from latching pins 44 because there are two latches holding each dispenser module in position. However, if a dispenser module is unlatched the dispenser module will move forwardly on guides 26 due to the force of gravity. An unlatched dispenser module will move in a forward direction until it engages the guide 58 which comprises an interior face of the door. A dispenser module in this position blocks the path 54. This prevents an unauthorized person from gaining access through the path to the medical items housed on the dislodged dispenser module or on dispenser modules located above the dislodged dispenser

module. The unlatched dispenser module renders the dispenser module at least partially inoperative and its improper position is apparent to a person opening the door to the dispenser. This provides an indication of tampering. Each of the dispenser modules 28 and 30 includes further features for preventing the unauthorized access to medications therein which are hereinafter described.

A fundamental aspect of the preferred embodiment of the present invention is that the dispenser modules 24 are selectively movable for purposes of loading the dispenser modules with medical items or inventorying items housed thereon. As shown in Figure 3, with lock 22 in an unlocked condition door 16 may be moved to an open position. In the open position of door 16 the dispenser modules 24 may be moved outwardly on guides 26. The dispenser modules may be moved outwardly through the opening 18 after unlatching the latching levers from the latching pins 44 in the enclosure.

In Figure 3, dispenser module 28 is shown in the outward position. In the outward position the medical items in the holders on the dispenser modules may be inventoried or replenished in a manner hereinafter discussed. After the activities related to dispenser module 28 have been completed, it may be moved back inward into the enclosure until the latching levers 36 again engage pins 44 and another dispenser module, such as dispenser module 30, may be moved outward through the opening.

The guides 26 on which the dispenser modules 24 are mounted preferably include stops. The stops limit the outward travel of the dispenser modules through the opening to a distance sufficient for purposes of replenishment or inventorying the medical items thereon. The guides normally hold the dispenser modules through the guide tracks, and limit movement of the modules to sliding motion along the direction of the guides. However as shown in Figure 4, in a preferred embodiment of the invention the guides 26 enable the dispenser modules to be completely released from the enclosure using conventional release mechanisms in connection with guides 26 and the guide tracks. The quick disconnect capability of the connector ends 34 on to wiring harnesses 32 enable the dispenser modules 24 to be electrically disconnected from the dispenser 10. This enables the dispenser modules to be taken to a remote location for replenishment, inventory purposes, a modification in configuration or for repair. The same or substitute dispenser modules may be reinstalled in connection with the guides and placed back in service in the dispenser 10.

One embodiment of dispenser module 28 is now described with reference to Figures 5 through 11. Dispenser module 28 includes a plurality of holders thereon for holding a plurality of different types of medical items. Each holder includes a spiral member or helix 74. Each helix is selectively rotatable by a dispenser mechanism which includes a rotating mechanism generally indicated 76. Each rotating mechanism preferably includes an electric motor 82 (only a portion of which is shown) and a spool 78. Spool 78 includes tabs thereon for releasibly holding the helix 74. Each helix also has a free end 80 which is positioned adjacent to the dispense location indicated 50 which is at the front of the module 28.

As shown in Figure 6, each spool 78 has in connection therewith a cam 83 and a cam operated switch 84. The cam and cam switch enable monitoring the rotational position of the helix 74. This enables the electric motors which are part of the rotating mechanisms 76 to accurately make one rotation in response to electrical signals delivered thereto. As will be appreciated by those skilled in the art, the rotation of each helix 74 one turn causes a medical item held thereon to be moved towards dispense location 50 adjacent the free end 80 of the helix. A medical item is preferably positioned in nested relation in each turn of the helix 74. As a result, with each rotation of the helix by the rotating mechanism one medical item is moved outwardly to disengage the free end 80 of the helix and to fall into path 54 when the dispenser module is mounted in the dispenser.

It should be appreciated that although all six of the helixes 74 shown in dispenser 28 in Figure 5 are of the same size and pitch, various sized helixes may be used. Different sized and pitched helixes may be used for dispensing different sized medical items. For example, a larger helix suitable for handling larger sized medical items will have fewer turns for a given length. As a result, such a helix will hold fewer medical items within the given length. A smaller helix will be suitable for handling smaller medical items and will have more turns and thus hold a larger number of medical items within the given length. As later discussed, this feature is used to advantage in a preferred form of the present invention by providing indicia on the dispenser module indicative of the number of medical items remaining in a helix.

A novel aspect of the preferred embodiment of the present invention is that each helix is secured in position by a u-shaped holder guide 86. Each holder guide includes a first portion 88 which extends in a longitudinal direction in an interior area of the helix 74. Each holder guide further includes a second portion 90. Second portion 90 extends in the longitudinal direction in an exterior area of the helix 74. In the preferred form of the invention second portion 90 includes an engaging end 92 which is movably positionable in an opening in a wall that extends adjacent to helix 74.

As shown in Figure 5, a guide wall 94 extends adjacent to each helix 74 and is fixably attached to dispenser module 28. Guide wall 94 in the embodiment shown serves to help guide and position the medical items held on helix 74 as they are moved forward thereon. As best shown in Figure 6, holder guide 86 includes a closed end portion 96. Closed end portion 96 is generally u-shaped and connects the first and second portions of the holder guide. Free end 80 of helix 74 passes through the holder guide as the helix rotates.

Guide wall 94 includes a pair of notches 98 at its forward end. Closed end portion 96 in the operative position extends through one of notches 98. Guide wall 94 also includes a tab 100 adjacent to its outward end. Tab 100 includes a pair of apertures 102. Holder guide 86 also extends through one of the apertures 102. This further helps to position the holder guide in a proper location as well as to constrain its movement.

Unauthorized persons attempting to obtain the medical items housed within the dispenser 10 may seek to dislodge the medical items held on the helixes 74. The holder guides 86 are operative to minimize the chance that this may occur. The first portion 88 of the holder guides which extends in the interior area of the helix prevents the helix from being disengaged from the holder guide 86. In addition, the closed end portion 96 prevents significant movement of the helix outwardly so that few if any medical items can be dislodged by using a tool that attempts to pull outwardly on the helix. A further aspect of the holder guides is that the engagement of the closed end portion 96 in one of notches 98 and apertures 102 makes it difficult to engage the holder guide when it is in position within the enclosure.

If by chance the engaging end 92 is disengaged from the opening to which it is releasibly attached by a person attempting to compromise the dispenser, the holder guide is constrained to move forwardly by the aperture 102. Any such attempted forward movement of the holder guide is limited by engagement of the holder guide with the interior surface 58 of the door 16 when the door is in the closed position. As a result, in the unlikely event that an unauthorized person is successful in dislodging the holder guide, the distance that the helix may be moved is very limited and the number of medical items that could be obtained in this manner is limited.

Authorized personnel who open the door 16 of the enclosure are enabled to readily remove the holder guide. This is accomplished because in the open position of the door the

holder guide is enabled to be moved forwardly through the aperture 102 an unlimited amount. This is done when reconfiguring the dispenser module 28 by installing a different sized helix. It should be noted that the purpose of the multiple notches 98 and apertures 102 on guide wall 94 is to enable the holder guide 86 to be selectively positioned so as to extend
5 in the proper location in the interior area of the helix. In addition, multiple openings are provided for engaging end 92 so it may be positioned in alignment with the notches and apertures in which the holder guide is positioned. This enables an authorized person to rapidly change the size and type helixes used in the dispenser module 28.

Dispenser module 28 further includes a plurality of guides 104. Each guide 104 which is shown in greater detail in Figures 9-11, is selectively positionable in disposed parallel relation with each guide wall 94. Each guide 104 is operative to help guide medical items supported on the adjacent helix 74 outwardly towards the free end of the helix.

Dispenser module 28 includes a supporting surface generally indicated 106 which in the embodiment of the invention shown, extends across the bottom of the dispenser module
15 28. Supporting surface 106 includes a plurality of first slots 108 which are uniformly spaced thereon. Supporting surface 106 further includes second slots 110 disposed rearwardly and in alignment with each of first slots 108.

Dispenser module 28 further includes support brackets 112. Support brackets 112 include a vertically extending wall portion which extends adjacent to spool 78. Support

bracket 112 further includes a generally horizontally extending wall portion which includes third slots 114 therein. Third slots 114 extend in aligned relation with second slots 110. In addition, third slots 114 extend downwardly a portion of the length of the vertically extending wall portion.

5 Guide 104 includes a hook portion 116 adjacent a first end. Guide 104 further includes a rear tab 118 and a finger portion 120. The downward and rearward configuration of tab portion 116 is operative to minimize the risk that guide 104 when engaged on dispenser module 28, can be disengaged by unauthorized persons attempting to gain access to the medical items in the dispenser. This is because the hook portion 116 when engaged in a first slot 108, cannot be readily moved out of engagement with the slot unless the guide is moved substantially upwardly adjacent to the rear tab 118 and finger portion 120. In the operative position of the dispenser module within enclosure 12 such upward movement is prevented either by an adjacent dispenser module, or in the case of an uppermost dispenser module by an interior wall bounding the enclosure.

15 As will be appreciated from Figures 5 and 6, guides 104 are selectively engaged with slots 108, 110 and 114 so that guide 104 extends a desired distance transversely disposed from corresponding guide wall 94. The distance that guide 104 is disposed from the guide wall depends on the physical size of the medical item held on the adjacent helix 74.

5 The installation of guide 104 requires that portion 116 be first engaged in one of first slots 108. Because of the configuration of hook portion 116 the engagement of the hook portion requires that the end of guide 104 including the finger portion be substantially raised relative to the supporting surface 106. Once the hook portion is engaged with a first slot 108, the opposed end of guide 104 is moved downwardly. As this is done rear tab 118 engages an aligned second slot 110. Finger portion 120 extends in an aligned third slot 114 and it is engaged to the vertically extending wall portion. This engagement at three points holds the guide 104 in position.

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Conversely, the removal of the guide requires first raising the end of the guide containing rear tab 118 and finger 120. Only after the end of guide 104 opposed from hook portion 116 has been sufficiently raised can the hook portion be disengaged from first slot 108. This is readily accomplished when the dispenser module 28 is in the position shown in Figure 3. However when the dispenser module is in the operative position within the enclosure as shown in Figure 2, any upward movement of the guide 104 at the end adjacent to finger 120 is restricted by the adjacent dispenser modules and/or the interior wall of the enclosure. As a result, any person attempting to gain unauthorized access to the medical items within the dispenser using a tool in the path 54, will find it difficult to achieve access to the medical items by dislodging guides 104.

20 As shown in Figure 10, guides 104 include a tapered front portion 105. Tapered portion 105 is positioned above hook portion 116 when the guide is in the operative position.

As shown in Figure 11, guide 104 includes elongated protuberances 107. The protuberances 107 serve to support medical items and minimize frictional resistance to movement. A tab portion 109 of the guide 104 also includes protuberances thereon which facilitate manually engaging the guide during installation and removal.

5 A further fundamental advantage of the preferred form of dispenser module 28, is that supporting surface 106 serves as a reference surface with indicia thereon which helps a user to readily determine the number of medical items being held in a helix. Figure 8 shows indicia generally indicated 122 which extend on supporting surface 106. Indicia 122 are spaced in aligned, side by side relation and correspond with the pitch of the turns in one of three different sized helixes. As can be appreciated from Figure 8, the helixes which are attached to spool 78 extend adjacent to and above indicia 122. The turns of the helix are positioned such that a user reviewing the indicia from above is able to observe the numbers corresponding to the helix through the turns of the helix. This makes it apparent which of the three sizes of helixes is installed. The indicia 122 are positioned so that the first number which is exposed is indicative of the number of medical items which are being held in the helix. This enables the user to quickly observe how many medical items are remaining on the helix for inventory purposes.

The use of the indicia in the preferred embodiment avoids the need for a user to have to count medical items held in a helix. This greatly reduces the time necessary for purposes
20 of taking inventory. Further, the indicia presents the advantage that nothing must be changed

when a helix which serves as a holder for the medical items is replaced with a different sized helix, which may need to be done for purposes of reconfiguring the system. In a preferred embodiment of the invention the indicia corresponding to different sized helixes may be presented in contrasting colors to make more apparent the number of items remaining to be dispensed.

As previously discussed, the preferred embodiment of dispenser module 28 may be configured in numerous ways to accommodate different sizes and types of medical items. An alternatively configured dispenser module generally indicated 128 is shown in Figure 12.

Dispenser module 128 is identical to dispenser module 28 except in the specific details noted.

Dispenser module 128 includes a holder generally indicated 124 for relatively large sized medical items. Holder 124 includes a first helix 126 disposed to the right as shown in Figure 10 and a second helix 130 disposed to the left as shown in Figure 12. Helix 126 is turned by a dispenser mechanism which includes a spool 132 supported on a first support bracket 134. Helix 130 is turned by a spool 136 of the dispenser mechanism which is supported on a support bracket 138. It should be noted that support brackets 134 and 138 are mirror images of one another.

Spools 132 and 136 are each driven by a rotating mechanism in increments of one turn in a manner previously discussed. However the rotating mechanisms are configured to rotate in opposite directions. Medical items which extend across holder 124 and engage each

of helixes 126 and 130 are moved uniformly in an outward direction until they disengage the free ends of the helixes and fall into path 54 of the dispenser.

Dispenser module 128 is configured to hold larger sized medical items than those which are held in the three other holders and associated helixes thereon. For example, holder 124 may be used to hold and dispense cards with a plurality of capsules and pills. Alternatively, holder 124 may be used to dispense medical items such as syringes or medical appliances.

It is a fundamental advantage of the preferred embodiment of the present invention that the dispenser modules may be configured for holding and dispensing medical items of various sizes, including those items which extend a substantial width. The only limiting factor for purposes of dispensing items is the width of items that are enabled to pass through the throat area 62 of the path 54 and into the pocket 56. Of course, in modified versions of the invention which are specifically adapted for dispensing large items the dispenser module of the type shown in Figure 12 can be used for dispensing very large items such as catheters and suction tubes which extend the full width of the dispenser module.

Alternative configurations for portions of dispenser modules are shown in Figures 24-26. It should be understood that these are alternative configurations for portions of dispenser modules which are otherwise similar to dispenser modules 28 and 128.

Figure 24 shows a support bracket 184 similar to support bracket 112 which is attached to a dispenser module. A motor (not shown) is operative to rotate a helix 186. A holder guide 188 similar to holder guide 86 extends in the interior of the helix 186 and is supported on a guide wall 190 in the manner previously described.

5 A guide 192 is positioned adjacent to helix 186. Guide 192 is similar to guides 104. Guide 192 is positioned to engage medical items 194. Medical items 194 are generally cylindrical items such as vials, ampules or other similar types of containers.

A limiting member 196 is positioned on holder guide 188 in the area inside the helix 186. Limiting member 196 which is shown in more detail in Figure 28, includes an opening 198 therethrough. Opening 198 is sized to accept the holder guide in relatively close fitting relation.

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The limiting member 198 functions to occupy a sufficient area within the interior of the helix so that the medical item 194 positioned at the front of the helix cannot fall through the central opening of the helix. This ensures that a medical item will be dispensed only
15 upon the proper rotation of helix 186. The limiting member 196 is particularly useful when the items being dispensed are relatively small compared to the inside diameter of the helix. The limiting member 196 may be readily removed to reconfigure the dispensing module to handle other types of medical items for which the limiting member is not required.

Figure 25 shows a configuration for a portion of a dispensing module similar to that shown in Figure 24 which is used for dispensing larger medical items 200. In the configuration shown in Figure 25 a helix 202 having a pitch suited to the size of items 200 is used. A guide 204 is also positioned to accommodate the size of the larger medical items.

5 An alternative configuration for a portion of a dispensing module is shown in Figure 26. In this configuration medical items 206 are dispensed. Medical items 206 are shown as relatively large ampules, but this is but one of several types of medical items that may be dispensed using this alternative configuration. Items 206 are positioned in a suitably sized helix 208. A holder guide 210 extends adjacent to the helix 208. Holder guide 210 is similar to holder guides previously described. The holder guide 210 may extend through the interior of the helix. As shown in Figure 26, the holder guide may also serve to position and hold the medical items 206 below the holder guide in the helix.

10 A wall 212 is positioned adjacent to the helix 208 and supports the holder guide 210 in a manner similar to that previously described. A helix guide 214 is positioned adjacent to helix 208 on a side opposite wall 212. The helix guide 214 which is shown in greater detail in Figure 27 is used in lieu of a guide wall. The helix guide 214 includes a pair of hook portions 216 and a pair of back tabs 218 which enable the helix guide to be selectively positioned in the first and second slots of the supporting surface of the dispenser module.

The helix guide provides support for helix 208 to hold it in proper position. It also operates to maintain the medical items 206 in a desirable position with one end disposed upward from the supporting surface. Positioning the medical items in this manner increases dispensing reliability. As also indicated in Figure 26, the dispenser configuration used with elongated items 206 can be included in a dispensing module with a configuration similar to those shown in Figures 24 and 25 for dispensing items 220.

Dispenser module 30 is shown in greater detail in Figure 14. Dispenser module 30 includes a plurality of holders which hold generally cylindrical containers having a circular cross section. These cylindrical containers may include ampules 68 and vials 70. Of course, other types of medical items including cartridges may be housed and dispensed. In Figure 14 ampules 68 are held in a holder 140 and vials 70 are held in a holder 142. Module 30 includes a third holder 144, however the medical items held therein are obscured by a movable cover 146. It should be understood that each of the holders 140, 142 and 144 have a mechanism associated therewith as described in co-pending U.S. Patent Application No. 08/361,783, the disclosure of which is incorporated herein by reference. As shown in Figure 15, the dispensing mechanism includes a movable front gate member 222 and a back gate member 224. These gate members move in coordinated relation to dispense the medical items from the holder one at a time in a controlled fashion in response to electrical signals. Dispensed medications pass from the dispense location 52 at the front of each holder in the dispenser module 30, and into the path 54 in the dispenser when the dispenser module is in the operative position.

As shown in Figure 15, a guide 226 is selectively positionable in guide slots 228 so the dispenser may dispense items of various diameters. A thin flexible limiting member 230 extends between the guide 226 and a top plate 147. Member 130 prevents medical items from being dislodged and passing out of the holder through the area between guide 226 and top plate 147.

As best shown in Figure 4, cover 146 is slidably and pivotally mounted about pivots 148. Cover 148 further includes downward depending locking tabs 150 which engage locking pins 152.

As shown in Figures 4 and 14, in the downward position of cover 146, the cover extends above and across the holders on dispenser module 30. Cover 146 is enabled to be moved to an up position by rotating it in a clockwise direction about pivots 148. This can only be accomplished by moving the cover 146 forward against the biasing force of a spring 154 so that locking tabs 150 disengage from the pins 152. This can be readily accomplished when dispenser module 30 is in the extended position out of the opening 18 of the dispenser and/or is disconnected from the dispenser as shown in Figure 4.

When dispenser module 30 is positioned within the interior area 14 of enclosure 12 as shown in Figure 2, the cover 146 cannot be moved to an up position. This is because movement of the cover is prevented by either an adjacent dispenser module when the dispenser module 30 is in other than the uppermost position in the dispenser. When the

dispenser module 30 is in the uppermost position as shown in Figure 2, movement of the cover 146 to the up position is prevented by engagement with the components of enclosure 12 and the lock 22. This configuration makes it difficult for an unauthorized person attempting to gain access to the medical items housed in the dispenser module to do so by extending a tool through the path 54. This further increases the security of the preferred embodiment of the invention.

As shown in Figure 14, medications in the holders are guided to move in a stack downwardly towards the dispensing mechanism, which is not shown because it is positioned under the cover 146 in Figure 14. The stack is guided to move downwardly by the biasing force of gravity guided by walls 156 which bound the sides of the enclosures. The medical items are further guided by movably positionable guides 158. A guide is shown in detail in Figure 19. Guides 158 extend upwardly from a supporting surface 160 which extends across the bottom of each holder and supports the stack of medical items thereon.

As best shown in Figure 16 which shows a holder in dispenser module 30 without the cover, the supporting surface includes a plurality of slots 162 and apertures 163. Guides 158 include tabs 165 which are selectively positionable in such slots 162 and projections 161 which are selectively positionable in apertures 163. This enables positioning the guide 158 a desired transverse distance from an adjacent wall 156.

A follower 164 is used in connection with a stack of vials 70 to assure that the vials move downwardly as they are dispensed. The follower 164 is a generally cylindrical weighted member that is rotatably movable in engaged relation with the medical items in the stack.

5 As best shown in Figure 17, follower 164 includes a plurality of axially spaced annular grooves 166. Annular grooves 166 are sized for accepting guide 158 therein. Follower 164 is of sufficient diameter and weight, and grooves 166 are configured, so that the force of gravity will cause the follower 164 to overcome any resistance to movement that may be caused by the engagement of guide 158 in a groove. This enables the follower to move downwardly and to apply a downward force to the medical items in the stack. This helps to assure their proper dispense. It should be noted that follower 164 has a slightly greater diameter on an end disposed from the grooves 166. This enables the axis of the follower to remain parallel to the supporting surface while in engagement with a lip 167 on the guide 158.

15 As will be appreciated with reference to Figure 14, annular grooves 166 in follower 164 are spaced in a manner that corresponds to the spacing of slots 162 and apertures 163. This enables the follower to be used with various sizes of medical items regardless of where the guide 158 may be positioned. The follower 164 has been found to be particularly advantageous when small or lightweight medical items are to be dispensed and it is desirable
20 to provide additional biasing force on the stack to be sure that the medical items do not

become caught on guides 158 or walls 156 in a manner which will prevent their proper dispense.

An alternative follower 232 is shown in Figure 18. Follower 232 is about the full width of the interior of a holder between side walls 156. Follower 232 may be used in dispensing relatively long medical items which do not require any guides 158 to be positioned in the holder.

While the preferred embodiment of the present invention includes features which provide greater security against access to the medical items stored therein by unauthorized personnel, it is important that authorized personnel have ready access to the interior area 14 of enclosure 12 for purposes of replenishing medical items, taking inventory or repairing dispenser modules. The preferred embodiment of the present invention includes the lock 22 which selectively enables or prevents the opening of door 16.

As best shown with reference to Figure 21, door 16 has an attached connection therewith a locking post indicated 168. Locking post 168 is sized for engagement in a slot 170 which extends in the body of lock 22. A movable locking pawl 172 is mounted adjacent to slot 170.

When door 16 is moved from the open to the closed position, locking post 168 moves into slot 170. As locking post 168 moves into the slot it engages the locking pawl 172 and

moves it to a position shown in Figure 21 where a portion of the pawl blocks the escape of the locking post from the slot 170. Upon reaching the locking position, the pawl 172 is held by a spring-loaded detent or similar conventional mechanism.

5 A fundamental advantage of the preferred embodiment of the present invention is that lock 22 once in a locked condition, may be moved to an unlocked condition by two independent unlocking mechanisms. This is advantageous because an authorized user is enabled to open door 16 using one of two secure methods. The first unlocking mechanism includes an electrically actuated solenoid 174. In response to an electrical signal, solenoid 174 is operative to move an actuator 176 of the solenoid in an inward direction relative to the solenoid, as shown in Figure 21. Actuator 176 rotates a member 178 which is operative to release pawl 172. The release of pawl 172 enables locking post 168 to move out of slot 170 and door 16 to be opened.

15 Lock 22 further includes a second unlocking mechanism which includes a mechanism that is operative to unlock the lock in response to manual manipulation. The second unlocking mechanism includes a lock cylinder 180, which has a member 182 in connection therewith. Member 182 is enabled to be rotated by insertion of a proper key (not shown) into lock cylinder 180. Upon rotation of the key in the lock cylinder, member 182 engages actuator 176 and moves it in a manner similar to that achieved by solenoid 174. This enables unlocking lock 22 with a key.

In the system of the preferred embodiment, an authorized user who is entitled to have access to the interior area of dispenser 10 inputs data into a display terminal which identifies the user as authorized to open the dispenser. The user then inputs appropriate commands. In response to the input of the proper commands, the display terminal outputs electrical signals which are eventually transmitted to solenoid 174, which changes lock 22 from a locked to an unlocked condition. This is generally the manner in which an authorized user will gain access to the interior area of the dispenser.

In the event of a malfunction which renders the display terminal inoperative or otherwise prevents the actuation of solenoid 174, an authorized user is provided with a key for lock cylinder 180. The insertion of the key enables opening the door 16 to accomplish the desired activity. Of course, in other embodiments enhanced security may be provided by including two different key locks and an appropriate mechanism for tying together the key locks so that both must be turned by different keys in order to open the door 16. It should also be understood that while the preferred method of manual manipulation used for unlocking the lock 22 is a key, in other embodiments other manually manipulatable locking mechanisms may be used. These may include for example, combination locks.

A sensing switch indicated 234 is positioned in the interior of the dispenser. When the door 16 is closed the switch is in contact with a strike 236. When the door opens the strike no longer contacts the switch. The switch 234 is operative to indicate to the display

terminal and the rest of the system whether the door is open or closed. The switch may be used to verify whether valid or invalid access has been gained to the dispenser.

If electronic access to the dispenser has been granted, the switch 234 verifies that the door 16 is opened. Likewise, it verifies that the door is closed when a user authorized to have access to the dispenser indicates to the display terminal they have completed their activity inside the dispenser. If key access is attained, a signal is generated by switch 234 which is received at the display terminal. The programming of the system preferably requires verification either immediately or subsequently that such key access is authorized.

Switch 234 also provides a signal which can be used to provide an indication that the dispenser has been accessed. This can be done with the system which includes the display terminal to indicate at devices or terminals connected to the system that the dispenser has been opened. Alternatively or in addition, switch 234 can be connected to a totally separate security system which monitors access to the dispensers in the system.

As will be appreciated from the foregoing description the preferred embodiment of the dispenser of the present invention provides flexibility in terms of reliably dispensing a wide variety of sizes and types of medical items. The dispenser is constructed to provide enhanced security against access to the medical items stored therein by unauthorized persons. However authorized persons are readily enabled to gain access to the dispenser.

Thus, the new dispensing apparatus for medical items achieves the above stated objectives, eliminates difficulties encountered in the use of prior devices and systems, solves problems and attains the desirable results described herein.

In the foregoing description certain terms have been used for brevity, clarity and understanding, however no unnecessary limitations are to be implied therefrom because such terms are for descriptive purposes and are intended to be broadly construed. Moreover, the descriptions and illustrations herein are by way of examples and the invention is not limited to the exact details shown and described.

In the following claims any feature described as a means for performing a function shall be construed as encompassing any means capable of performing the recited function and shall not be deemed to be limited to the particular means shown in the foregoing description or mere equivalents thereof.

Having described the features, discoveries and principles of the invention, the manner in which it is constructed and operated, and the advantages and useful results attained; the new and useful structures, devices, elements, arrangements, parts, combinations, systems, equipment, operations, methods, processes and relationships are set forth in the appended claims.

CLAIMS

We claim:

1. A dispenser apparatus for dispensing medical items comprising:

an enclosure, wherein said enclosure bounds an interior area, and
wherein said enclosure includes an opening to said interior area;

a door in operative connection with said enclosure, wherein said door is
movable between a closed position wherein said door closes said opening, and
an open position wherein said door is disposed away from said opening;

a path extending in said enclosure, wherein said path is in connection
with a delivery area, whereby dispensed medical items are accessible to a user
in said delivery area;

a dispenser module, wherein said dispenser module is movably mounted
on said enclosure, wherein said dispenser module includes a holder, wherein
said holder enables holding said medical items therein, and a dispenser
mechanism wherein said dispenser mechanism is selectively operable to
dispense medical items from said holder at a dispense location, and wherein
said module is movable on said enclosure between a first position and a second
position, wherein in the first position said module is within said enclosure and
said dispense location is positioned adjacent the path, and wherein when said
door is in the open position the dispenser module is movable to the second

position, wherein in said second position said module extends through said opening and said holder is manually accessible, whereby said medical items may be added or removed therefrom.

2. The apparatus according to claim 1 wherein said holder includes a helix,
5 wherein said helix separates an inside area within said helix from an exterior area outside said helix, and wherein said dispenser mechanism includes a rotating mechanism selectively rotating the helix, and wherein said dispenser module further includes a holder guide, wherein said holder guide is in operative connection with said module, and wherein said holder guide includes a first portion extending in a longitudinal direction in the inside area of the helix and a second portion extending in the longitudinal direction and in the exterior area of said helix.

3. The apparatus according to claim 2 wherein said helix terminates at a free end adjacent to said dispense location, and wherein said first and second portions of said holder guide are connected through a closed end portion, and wherein upon rotation of said helix
15 said free end is movable through said closed end portion of said holder guide.

4. The apparatus according to claim 2 wherein said holder guide is releasibly mounted on said dispenser module, and wherein said holder guide is required to move to disengage from said helix, and wherein when said dispenser module is in the first position

and said door is in the closed position, movement of said holder guide to disengage from said helix is prevented by said door.

5. The apparatus according to claim 3 and further comprising a first guide wall extending in the longitudinal direction in said exterior area, and wherein said first guide wall is disposed between said first and second portions of said holder guide, and wherein said closed end portion of said holder guide is engaged with said first guide wall.

6. The apparatus according to claim 2 wherein said rotating mechanism includes a spool, and wherein said spool is releasibly engageable with a first end of said helix, and wherein said holder guide is movably positionable on said module, and wherein said helix is replaceable with a second helix having a different diameter, wherein said second helix has a second inside area, and wherein said holder guide is movable to a second position wherein said first portion of said holder guide extends in the second inside area of said second helix.

7. The apparatus according to claim 5 wherein said dispenser module further comprises a second guide wall disposed from said first guide wall in a direction transverse of said longitudinal direction, and wherein said helix is positioned between said first and second guide walls, and wherein said first and second guide walls are movable relative to one another in the transverse direction.

8. The apparatus according to claim 1, wherein movement of said dispenser module from said first position towards said second position when the door is in the closed position causes said dispenser module to extend in said path.

9. The apparatus according to claim 8 wherein said dispenser module includes a supporting surface, and wherein said holder is disposed on a first side of the supporting surface, and wherein when said dispenser module extends in said path said supporting surface is disposed between said holder and said delivery area.

10. The apparatus according to claim 8 and further comprising a releasible locking mechanism releasibly holding said dispenser module in the first position, and further comprising a biasing mechanism biasing the dispenser mechanism towards the second position, wherein when said releasible locking mechanism is released with said door in the closed position the biasing mechanism biases the dispenser module to move to extend in blocking relation in the path.

11. The apparatus according to claim 8 and further comprising a second dispenser module mounted within the interior area of the enclosure, wherein said second dispenser module includes a second dispense location adjacent said path and a second holder for holding medical items therein, and wherein when said first dispenser module extends in said path said first dispenser module is disposed in said path between said second dispense location and said delivery area.

12. The apparatus according to claim 1 and further comprising a second dispenser module movably mounted on said enclosure, and wherein when said first and said second dispenser modules are in the first position in said enclosure, said second dispenser module is disposed in a first direction from said first dispenser module, and wherein the holder of the first dispenser module includes a guide, wherein said guide is releasibly engageable with said first dispenser module, and wherein release of said guide from said first dispenser module is enabled responsive to movement of said guide in the first direction, and wherein when said first dispenser module is in the first position said second dispenser module blocks sufficient movement of said guide in the first direction to enable disengagement of said guide from said first dispenser module.

13. The apparatus according to claim 12 wherein said guide comprises a hook portion, and wherein said hook portion is operatively engaged to the first dispenser module adjacent said path, and wherein said guide is required to rotate a first angular distance to disengage said hook portion, and wherein rotation of said guide said first angular distance is prevented by the second dispenser module in the first position of said first and second dispenser modules.

14. The apparatus according to claim 13 wherein said first dispenser module includes a plurality of disposed slots, and wherein said guide is selectively positionable on said first dispenser module when said first dispenser module is in said second position by selectively engaging said hook portion in a selected one of said plurality of slots.

15. The apparatus according to claim 14 wherein said guide includes a finger portion disposed at an end of said guide opposed of said hook portion, and wherein said dispenser module comprises a plurality of second slots, wherein said second slots are disposed from said first slots, and wherein said finger portion is selectively engageable with one of said second slots.

16. The apparatus according to claim 1 and further comprising an energy absorbing carom surface disposed in said path intermediate of said dispense location and said delivery area.

17. The apparatus according to claim 16 wherein said door includes an interior surface, and wherein said interior surface is configured to guide medical items from said dispense location towards said carom surface.

18. The apparatus according to claim 16 wherein said delivery area includes a pocket, wherein said pocket is disposed vertically below said carom surface.

19. The apparatus according to claim 16 wherein said delivery area is disposed in a downward direction and an outward direction relative to said carom surface, and wherein said carom surface extends in a direction that extends both downward and outward.

20. The apparatus according to claim 19 wherein said delivery area is bounded in the outward direction by an energy absorbing stop surface.

21. The apparatus according to claim 16 wherein said path includes a throat area, wherein a cross sectional area of said path is reduced in said throat area, and wherein said carom surface extends in said throat area.

22. The apparatus according to claim 1 wherein said holder comprises a pair of disposed helixes, whereby one medical item is engageable with each of said helixes, and wherein said dispenser mechanism comprises a rotating mechanism, and wherein said rotating mechanism selectively rotates said helixes in coordinated relation to move an item engaged with said helixes to the dispense location.

23. The apparatus according to claim 22 wherein said rotating mechanism is operative to counterrotate said helixes relative to one another.

24. The apparatus according to claim 22 wherein said dispensing mechanism is adjustable wherein a transverse distance between said helixes is selectively adjustable, whereby medical items of varied transverse dimensions are enabled to be dispensed from said dispenser module.

25. The apparatus according to claim 1 wherein in said second position of said dispenser module said dispenser module is disengageable from said enclosure.

26. The apparatus according to claim 25 and further comprising a quick disconnect electrical connector, wherein said connector is enabled to be disconnected from said dispenser module when said dispenser module is in the second position.

27. The apparatus according to claim 1 wherein said holder comprises a reference surface extending adjacent medical items in said holder, wherein said reference surface includes indicia thereon indicative of numbers of medical items in said holder.

28. The apparatus according to claim 27 wherein said holder comprises a rotatable helix and said reference surface extends adjacent said helix.

29. The apparatus according to claim 28 wherein said dispenser mechanism includes a spool, wherein said spool is releasibly engageable with a plurality of different sized helixes, and wherein said reference surface includes indicia corresponding to each of said plurality of different sized helixes.

30. The apparatus according to claim 29 wherein said indicia extends in parallel, side by side relation on said reference surface.

31. The apparatus according to claim 1 wherein said dispenser module includes a plurality of holders, wherein each holder comprises a rotatably movable helix.

32. The apparatus according to claim 1 and further comprising a second dispenser module movably mounted on said enclosure independent of movement of the first dispenser module, and wherein said second dispenser module includes a second holder, wherein medical items are enabled to be held in the second holder, and wherein said second dispenser module includes a second dispenser mechanism, wherein said second dispenser mechanism is selectively operable to dispense medical items in said second holder at a second dispense location, and wherein said second dispenser module is movable between a third position and a fourth position, and wherein in said third position said second module is housed within said enclosure and said second dispense location is positioned adjacent said path, and wherein when said door is in the open position the second dispenser module is movable through said opening to the fourth position wherein said second holder is manually accessible.

33. The apparatus according to claim 32 wherein in the first and third positions of said first and second dispenser modules respectively, said second dispenser module is disposed vertically above said first dispenser module and the second dispense location is disposed in closer proximity to said opening than said first dispense location.

34. The apparatus according to claim 32 wherein the first dispenser module includes in the first holder at least one first type medical item, said first type medical item

comprising a solid medication, and wherein said second dispenser module includes in the second holder at least one second type medical item, said second type medical item comprising a liquid medication, and wherein the first and second dispenser modules are each movably mounted on guides supportably connected with said enclosure, wherein the first and second dispenser modules are interchangeably positionable on said enclosure on said guides.

35. The apparatus according to claim 34 wherein said second dispenser module includes a movable cover, wherein in the fourth position of said second dispenser module said cover is movable between an up position and a down position, and wherein in the down position said cover extends in adjacent relation above the second holder, and wherein when said second dispenser module is in the third position said cover is prevented from moving to the up position.

36. The apparatus according to claim 1 wherein the dispenser module includes a plurality of said medical items, and wherein each of said medical items includes a generally cylindrical container, and wherein said containers are arranged in aligned side by side relation in a stack, and wherein in the first position of said dispenser module said containers in the stack are biased to move by gravitational force towards the dispense location, and further comprising a follower in engagement with said stack, wherein said follower is generally cylindrical in cross section, and further comprising a guide in supporting connection with said dispenser module, wherein said guide extends adjacent said stack, and wherein said follower includes at least one annular groove, and wherein said guide extends in

said annular groove during rotational movement of said follower towards said dispense location.

37. The apparatus according to claim 1 and further comprising a lock, wherein in a locked condition said lock holds said door in the closed position, and wherein in an unlocked condition of said lock said door is enabled to be moved to the open position, and further comprising a first unlocking mechanism and a second unlocking mechanism wherein each of said first and second unlocking mechanisms are independently enabled to change said lock from the locked to the unlocked condition, and wherein said first unlocking mechanism is operative responsive to electrical signals and said second unlocking mechanism is operative to responsive to manual manipulation.

38. The apparatus according to claim 1 wherein said holder includes a helix, and wherein said helix separates an inside area within said helix from an exterior area outside said helix, and wherein said helix includes a free end, and wherein said dispenser mechanism includes a rotating mechanism selectively rotating said helix, and wherein said dispensing mechanism further includes a limiting member extending in the inside area of said helix and adjacent said free end, wherein said limiting member is operative to prevent medical items from passing through said inside area absent rotation of said helix.

39. The apparatus according to claim 38 wherein said dispenser module further includes a holder guide, and wherein the holder guide extends in the inside area of the helix, and wherein the limiting member is in supporting connection with the holder guide.

ABSTRACT

A dispenser (10) for dispensing medical items (68, 70, 72) includes dispenser modules (28, 30) movably mounted thereon. The dispenser modules are selectively operative to dispense medical items therefrom into a path (54) which is connected to a delivery area (20) of the dispenser. The dispenser and the dispenser modules therein are configured to provide security against unauthorized access thereto. However an authorized user is enabled to readily access the dispenser modules and the medical items therein by unlocking a lock (22), opening a door (16) and extending the dispenser modules through an opening (18). With the dispenser modules in the extended position the medical items therein may be replenished. Alternatively, the dispenser modules may be disconnected from the dispenser and replaced with substitute dispenser modules.

552220 " 034350

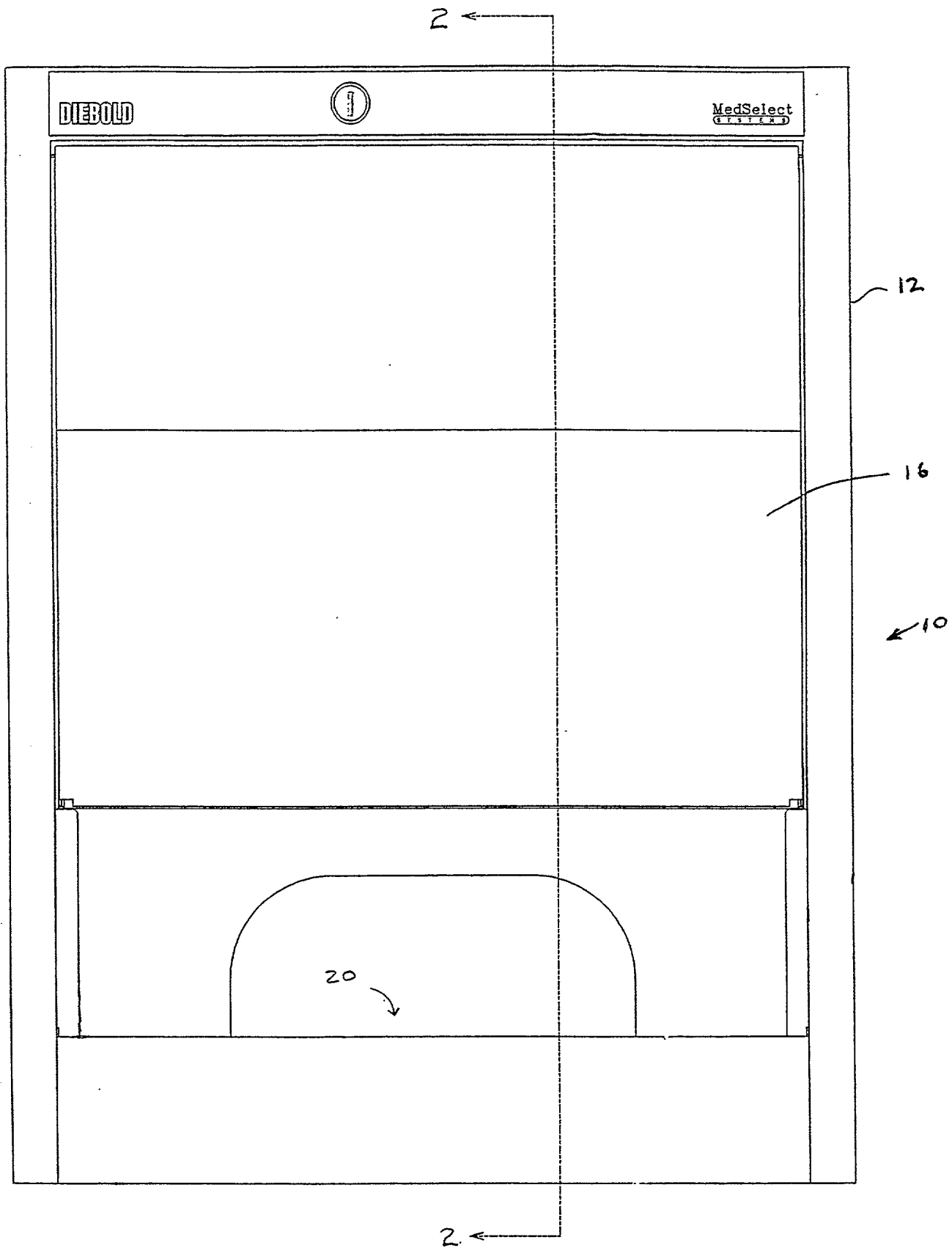


FIG 1

66/280" 05376660

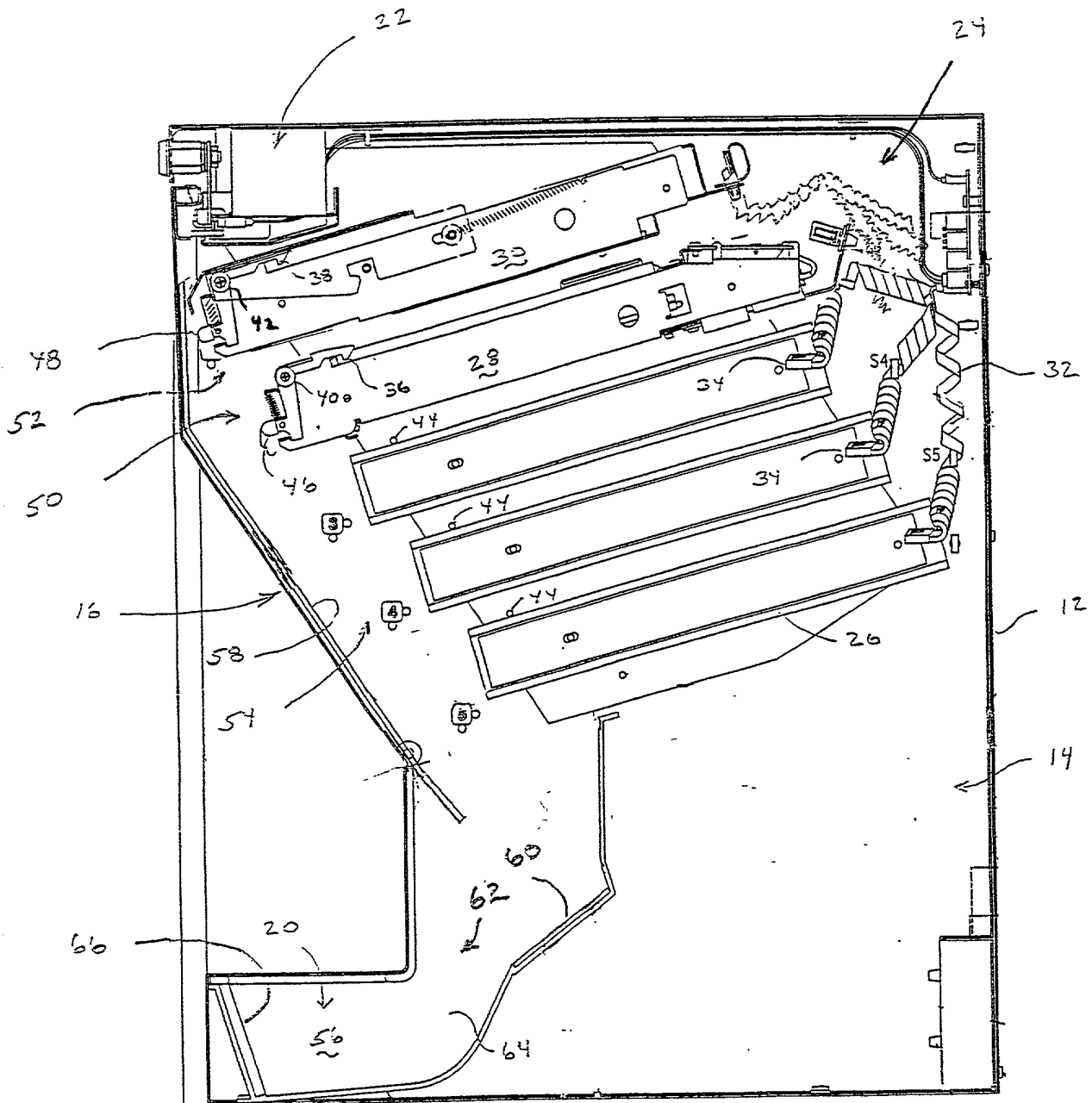


FIG 2

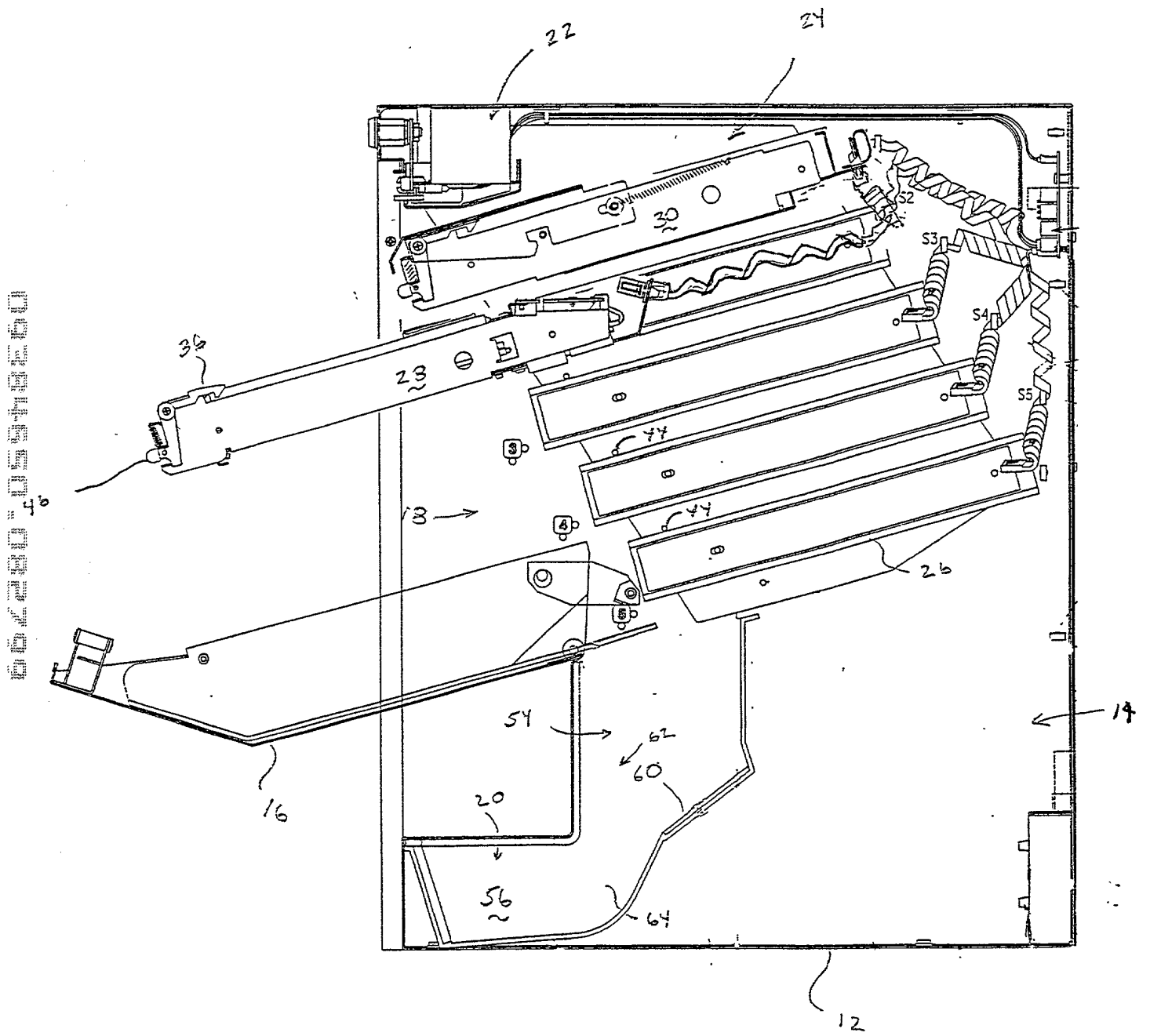


FIG 3

101

112

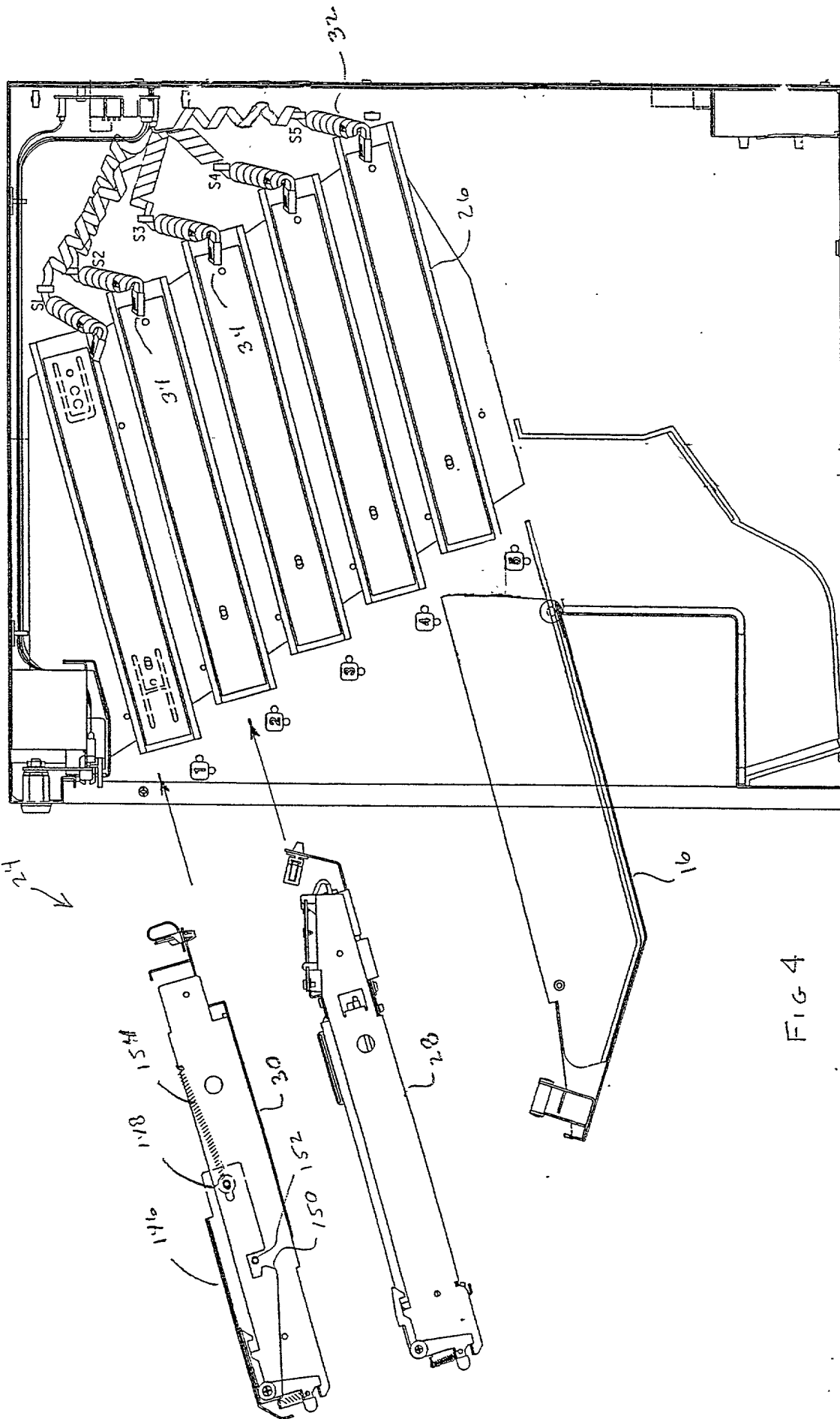


FIG 4

FIG. 5

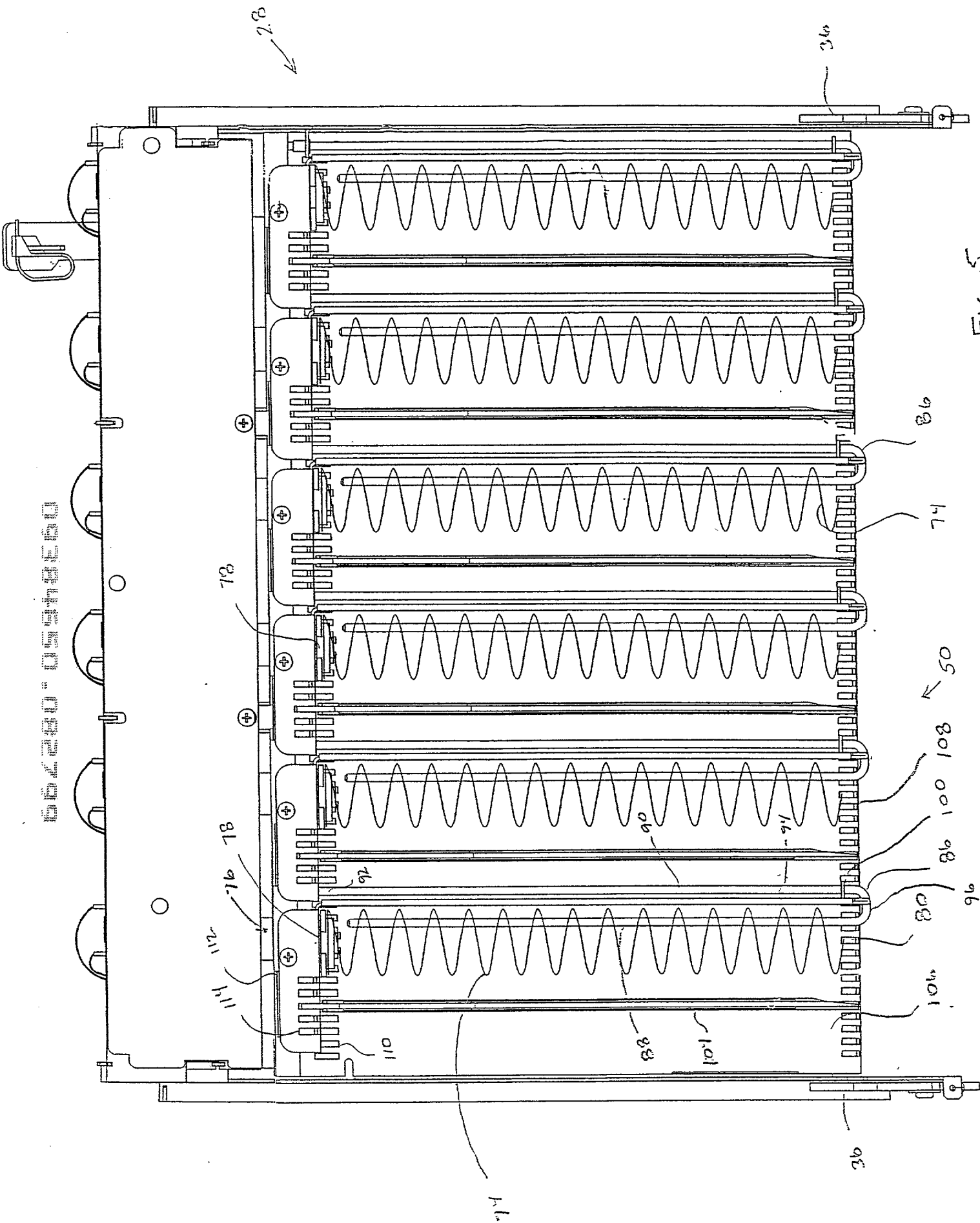
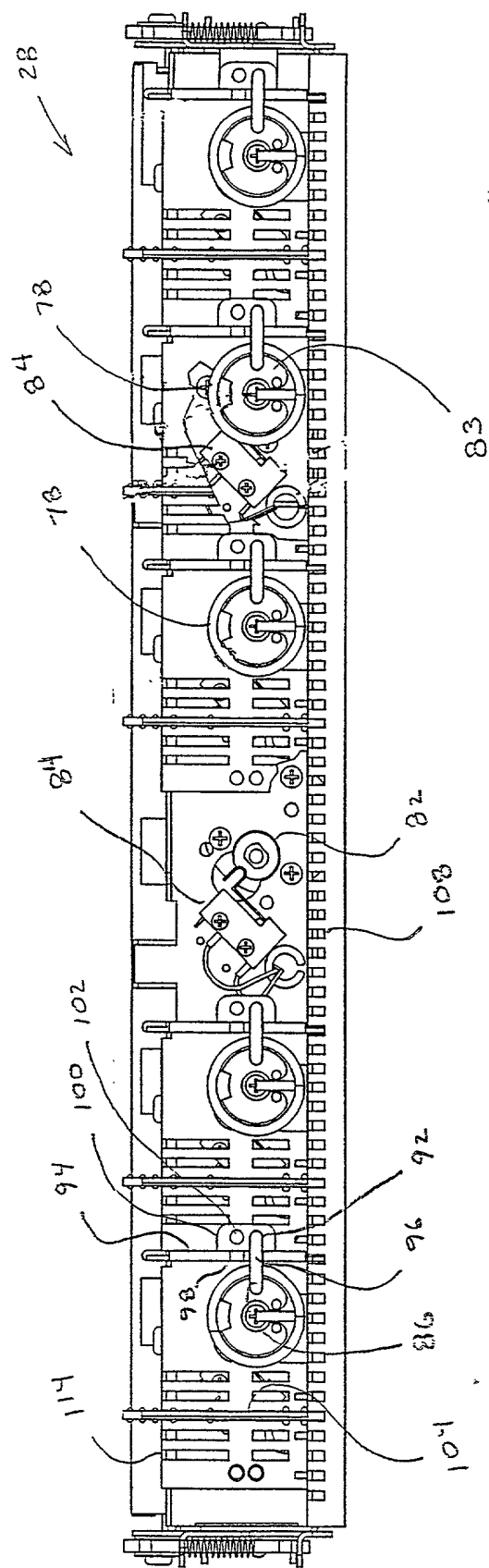


FIG. 5

[illegible]

616

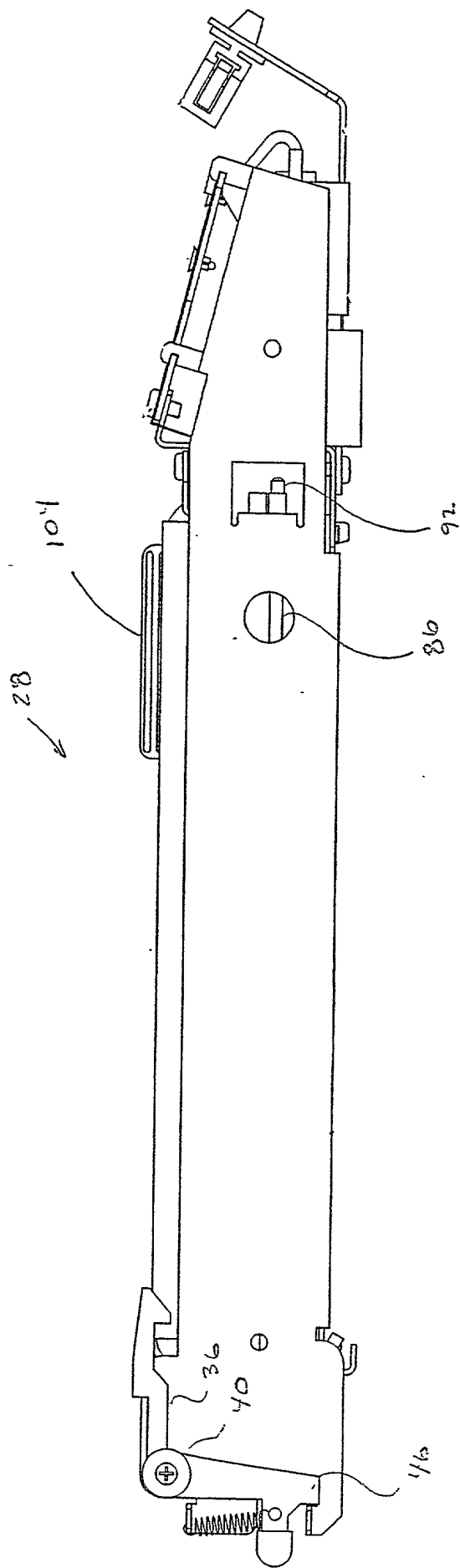
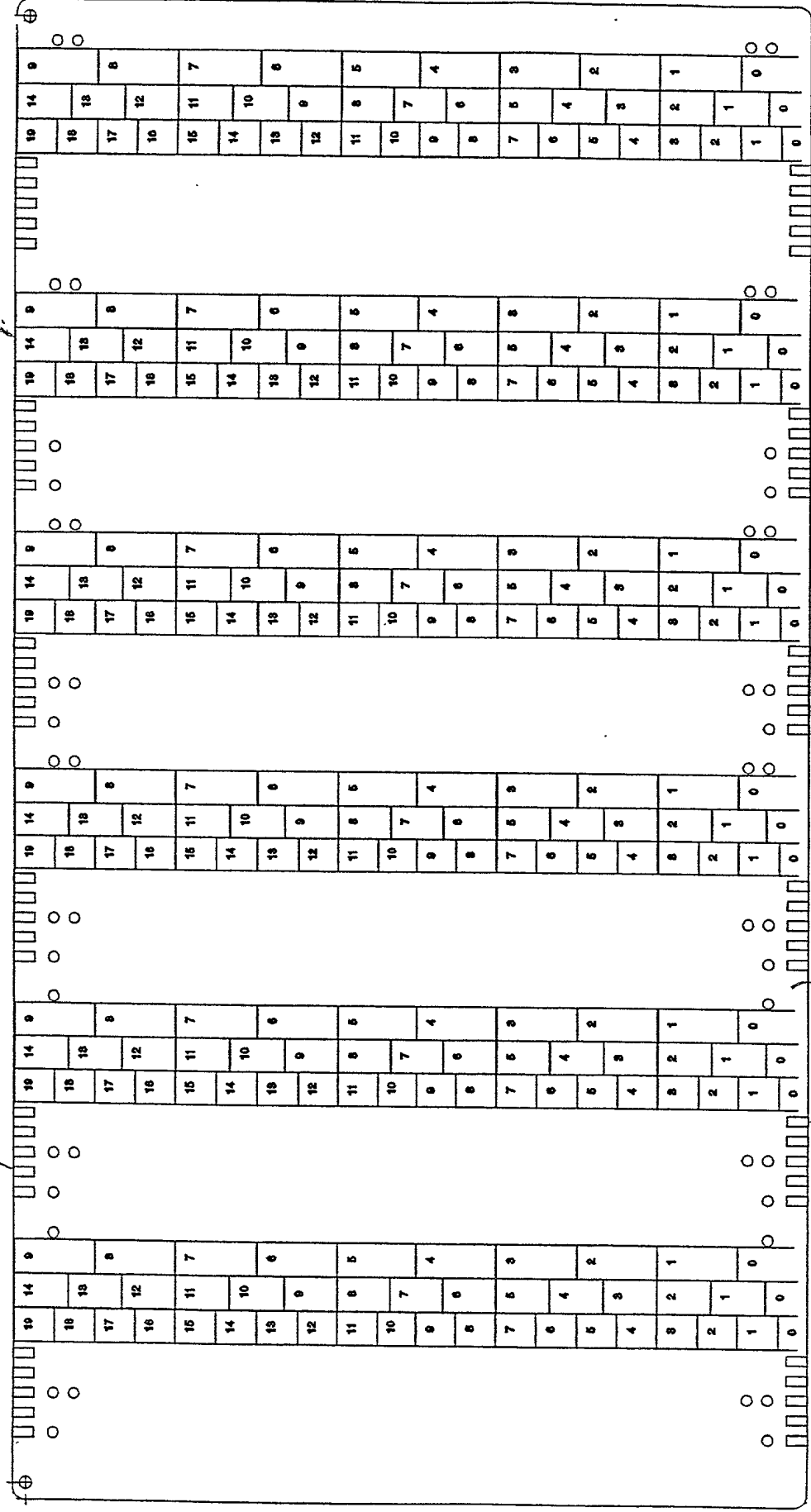


FIG 7

101

122



106

108

Fig 8

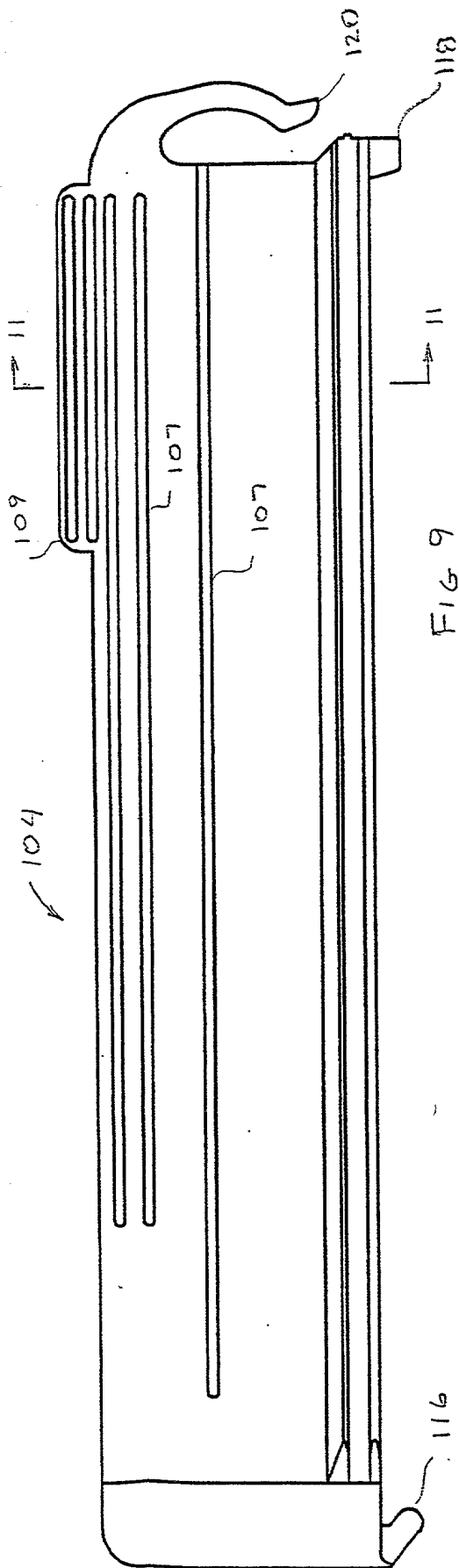


FIG 9

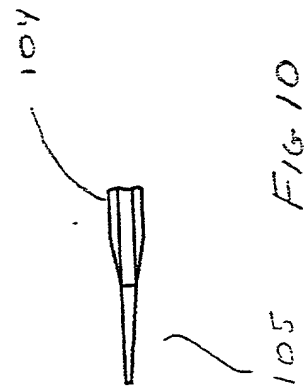


FIG 10

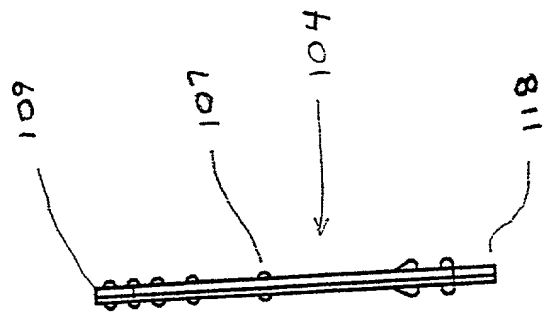


FIG 11

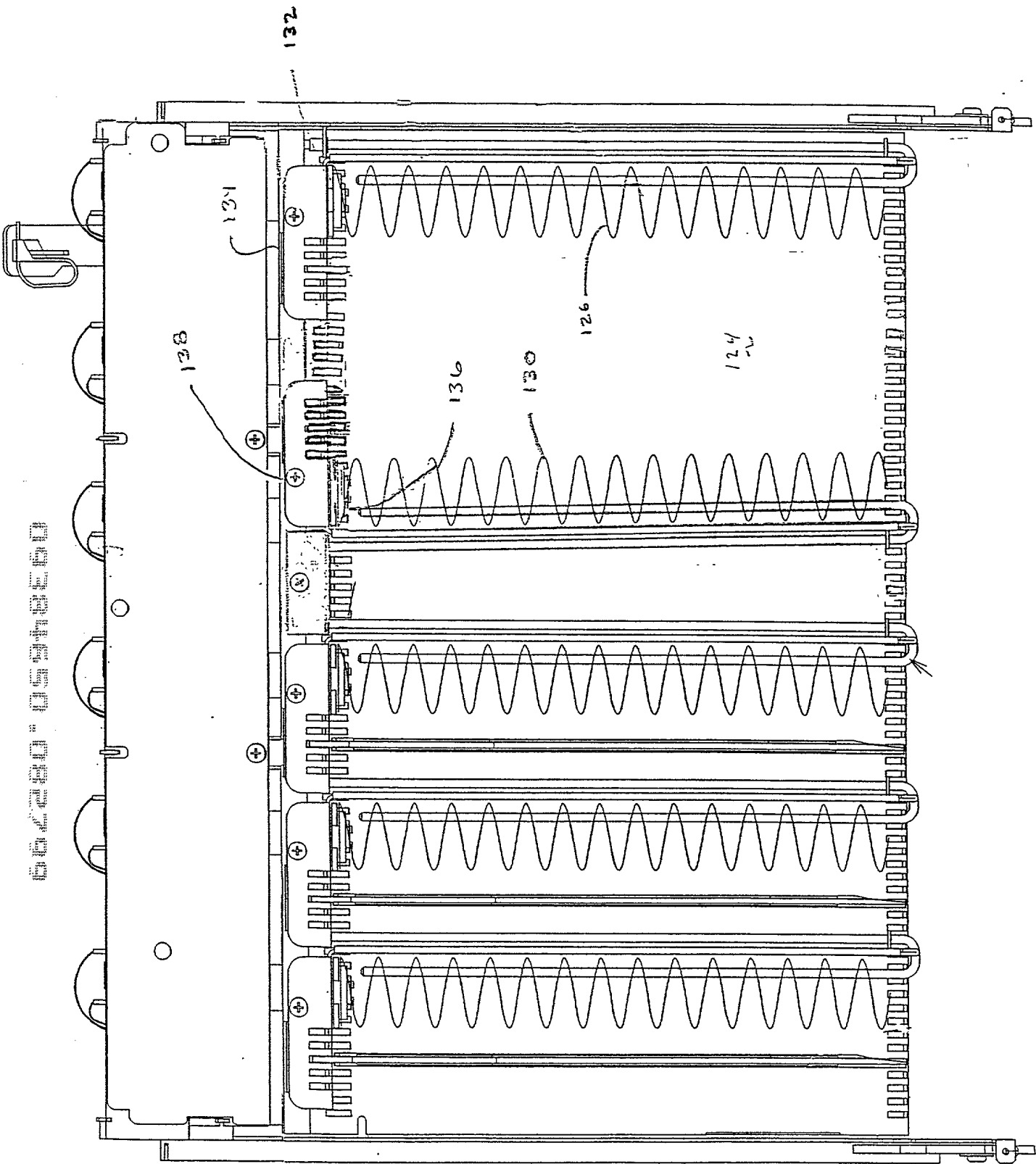


Fig. 12

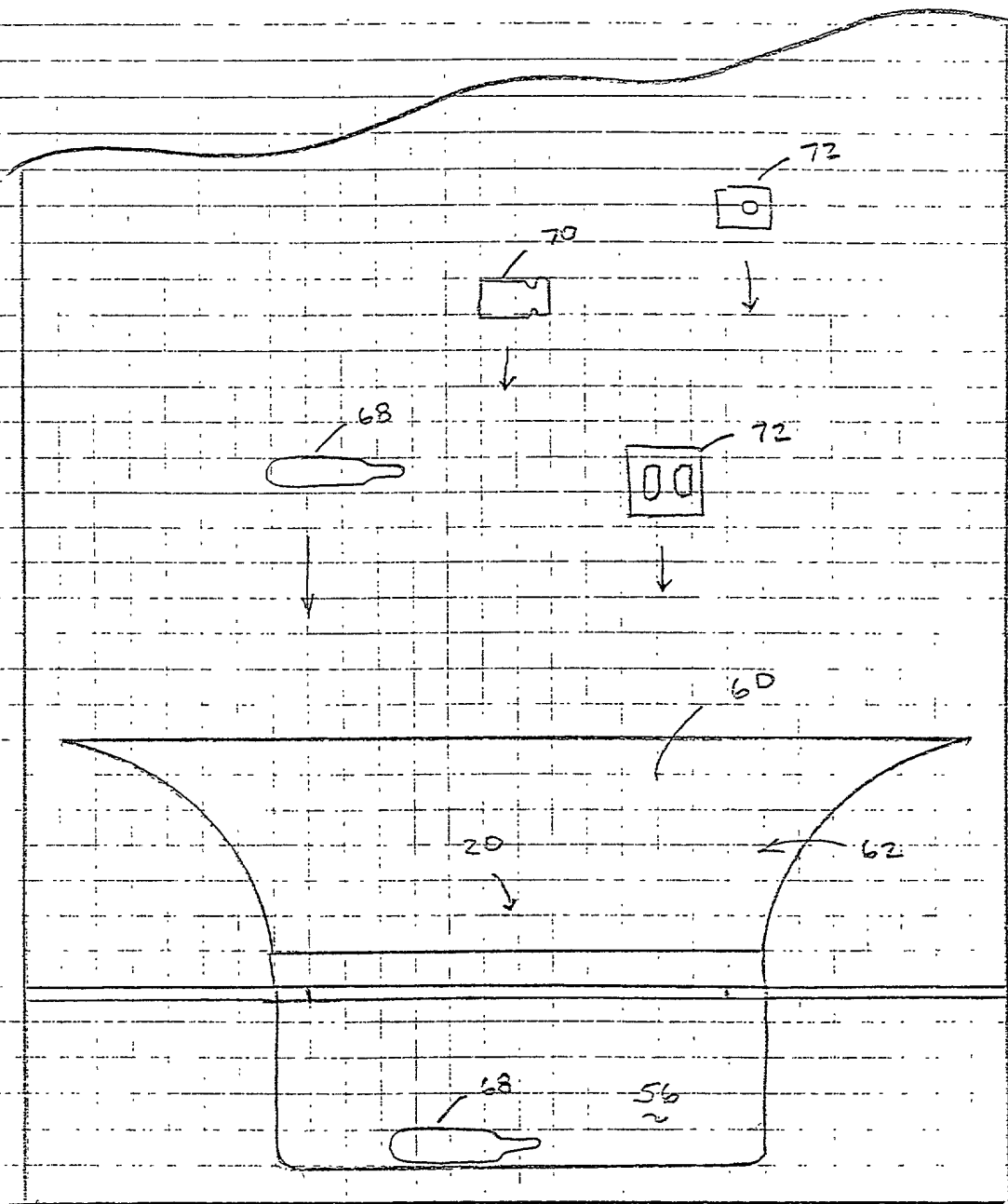
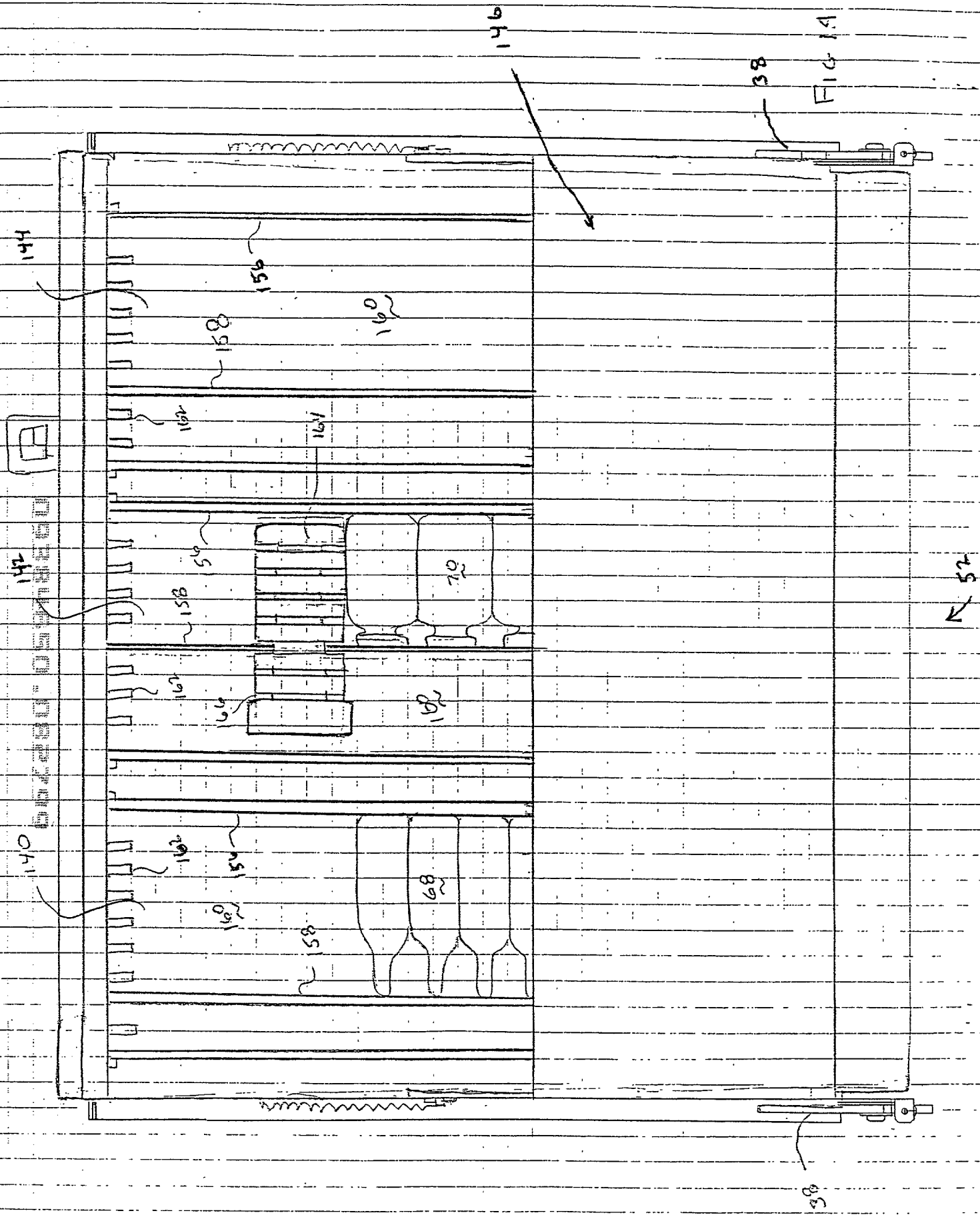


FIG 13



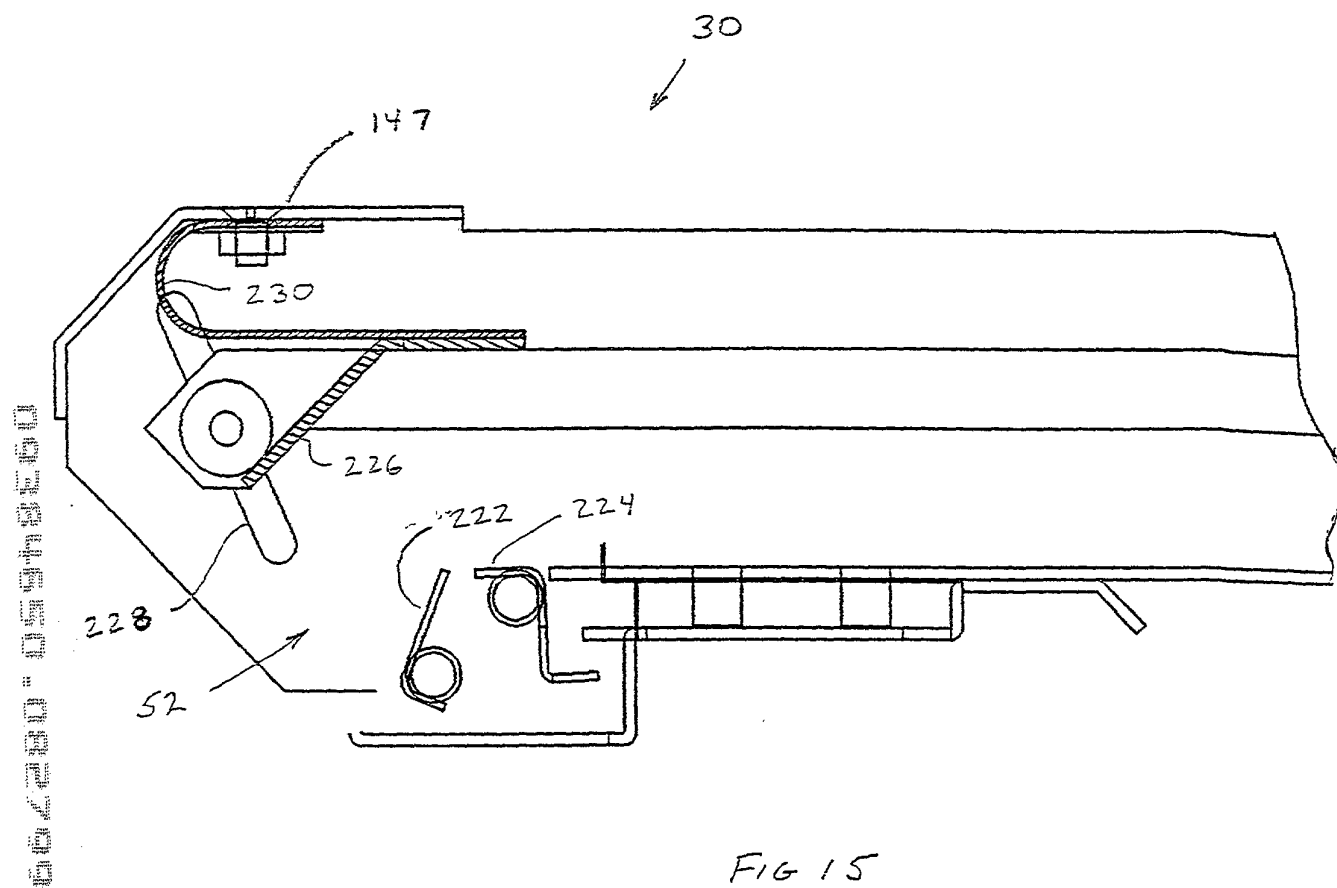


FIG. 16

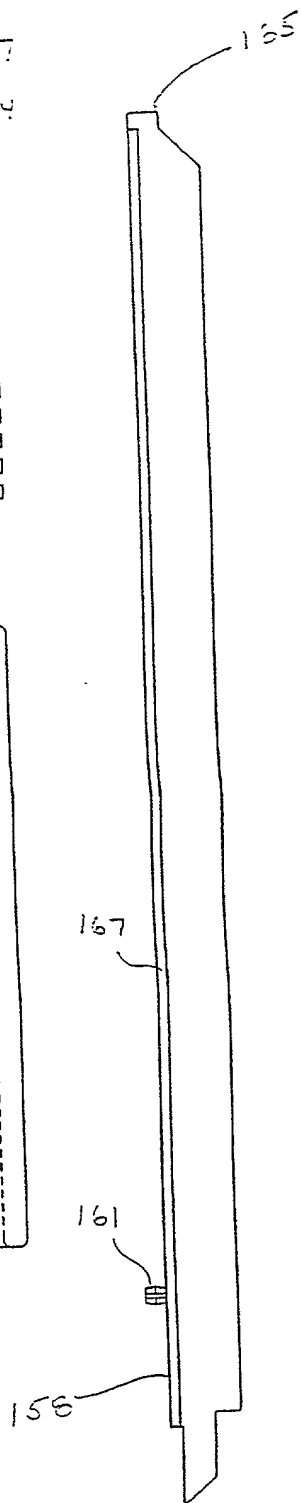
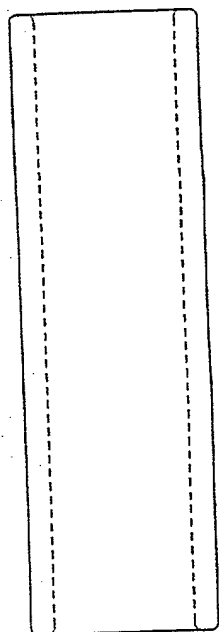
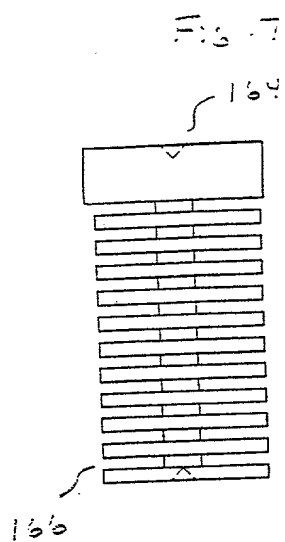


FIG. 19

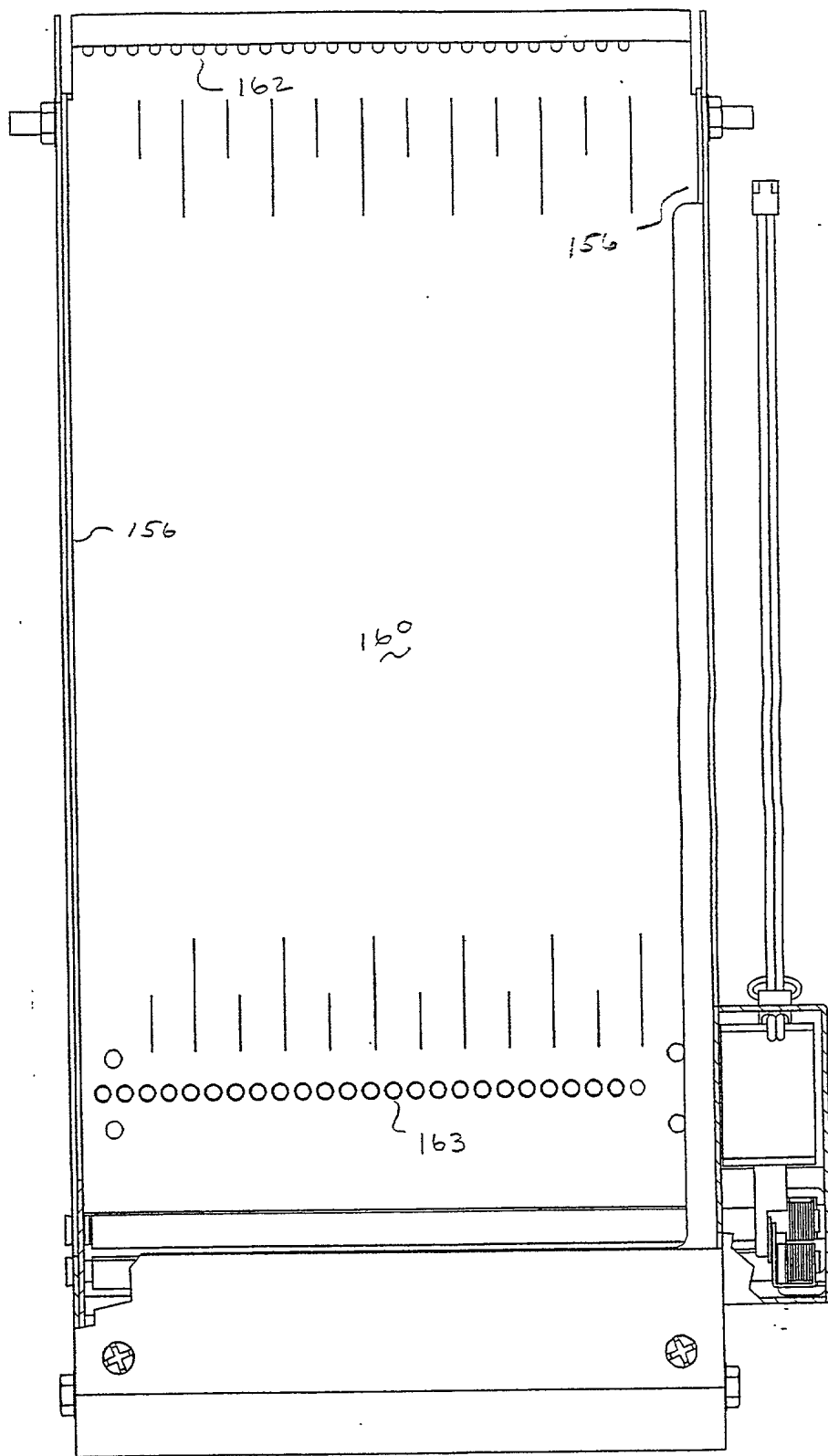


FIG. 16

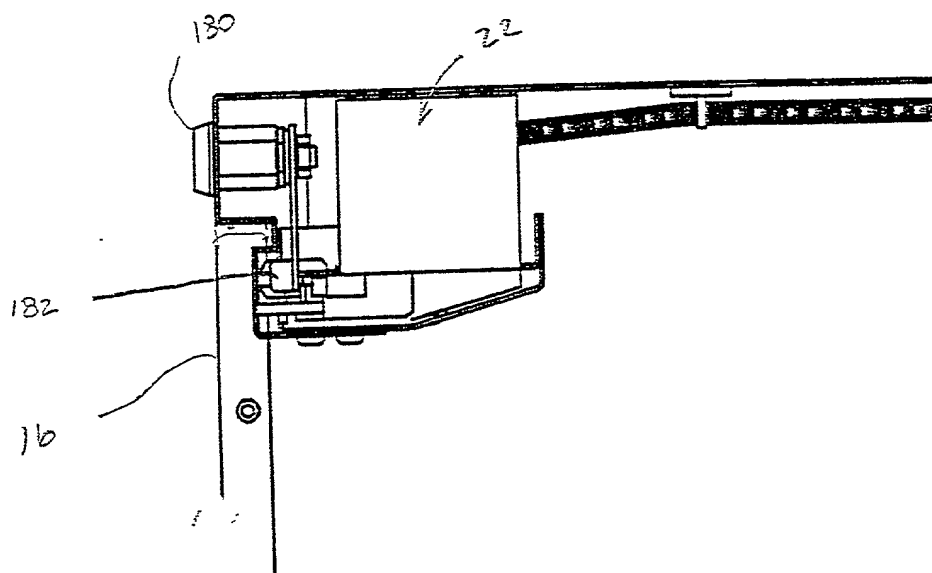


FIG 20

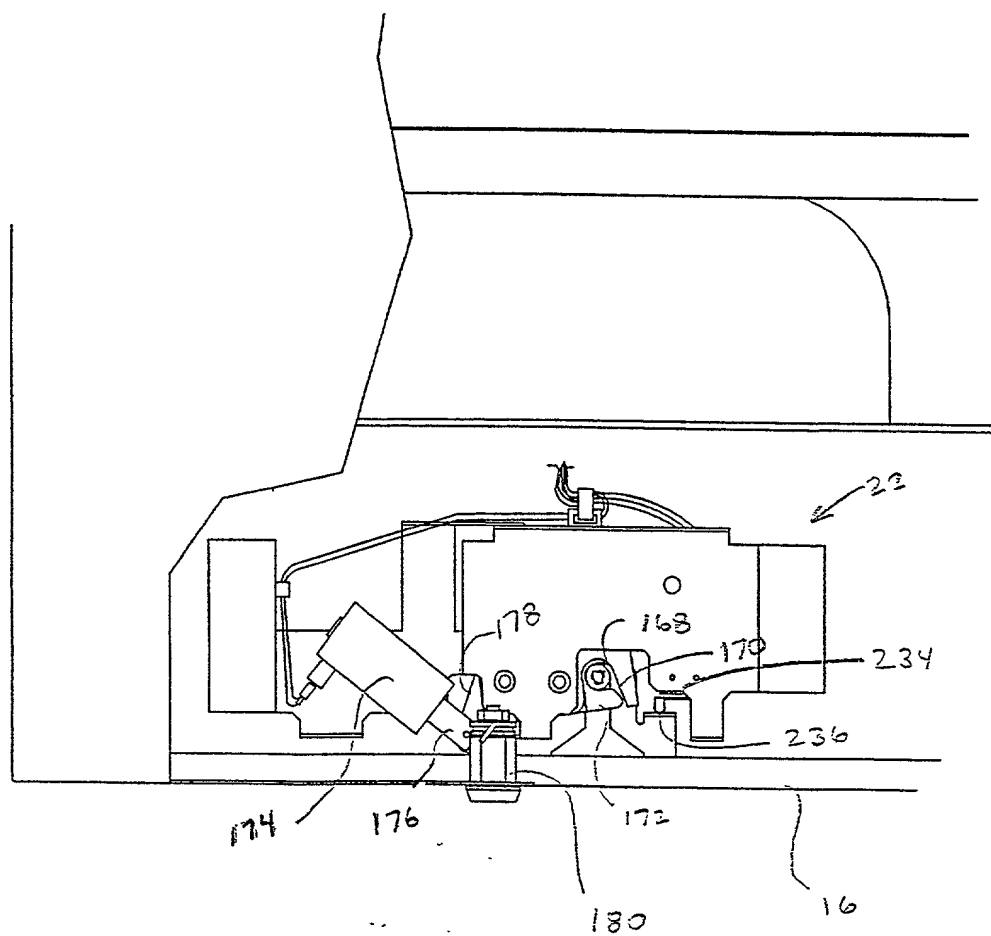


FIG 21

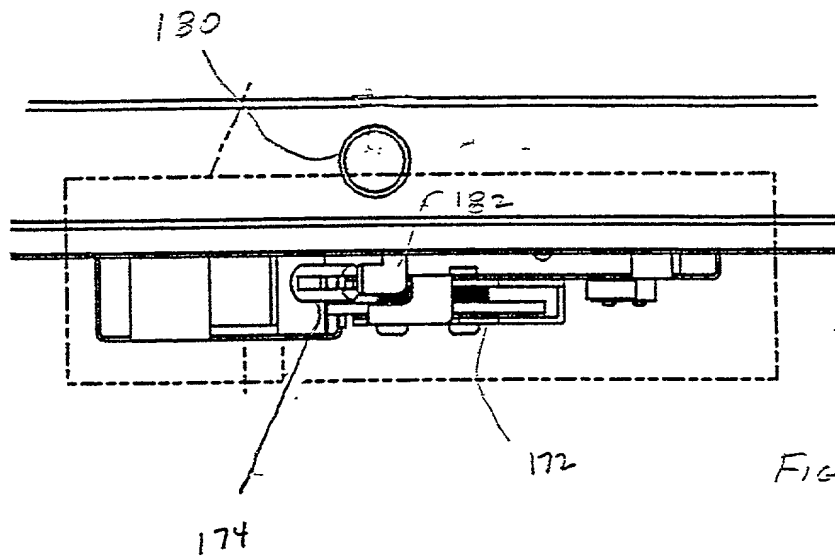


FIG 22

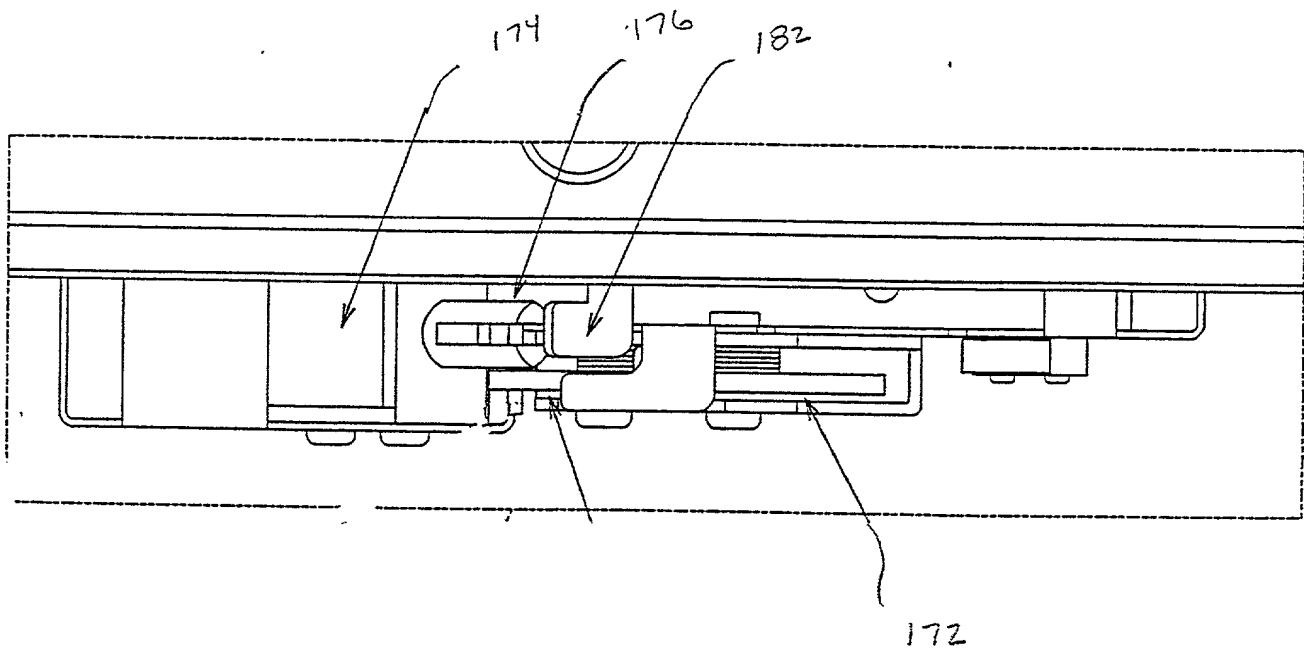


FIG 23

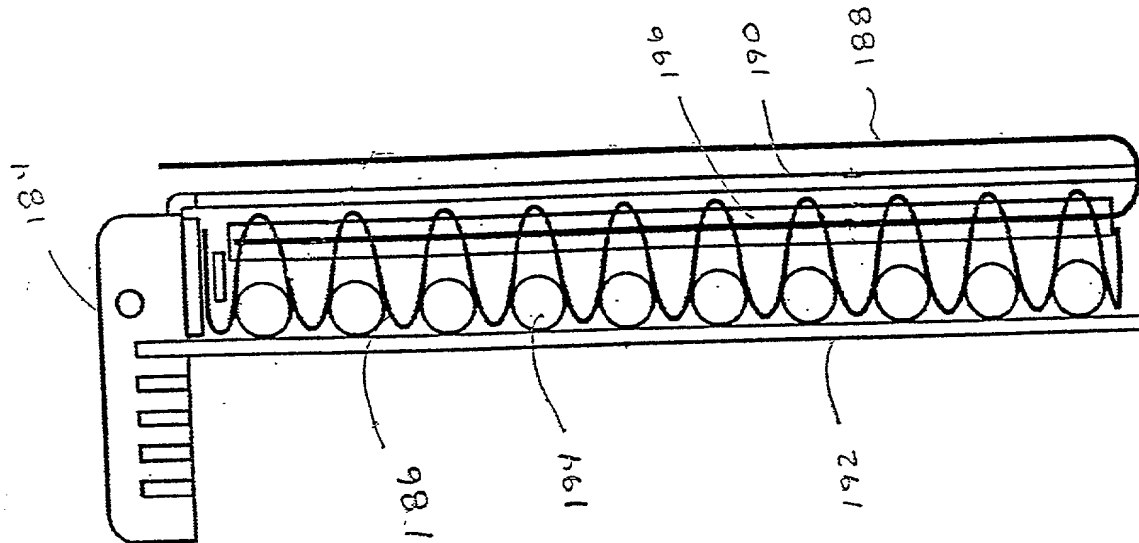


FIG. 24

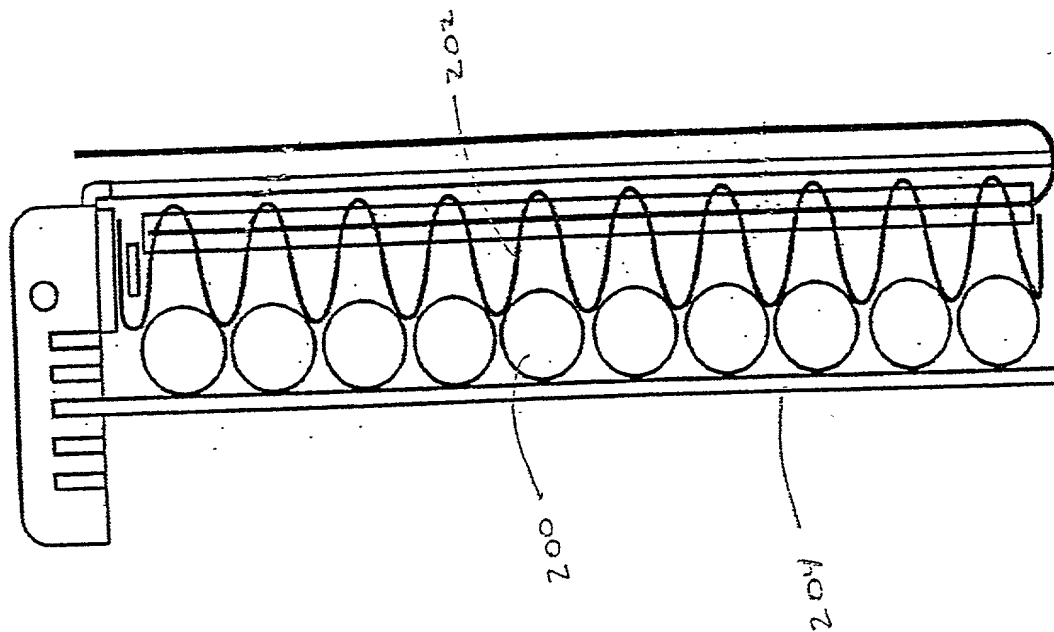
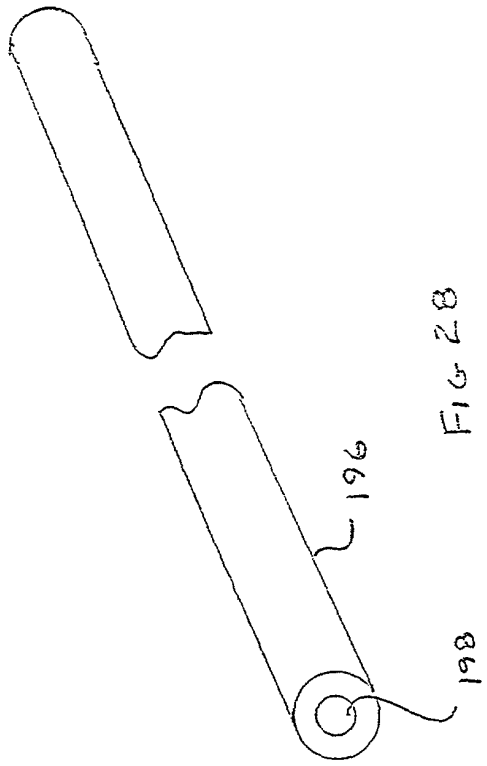
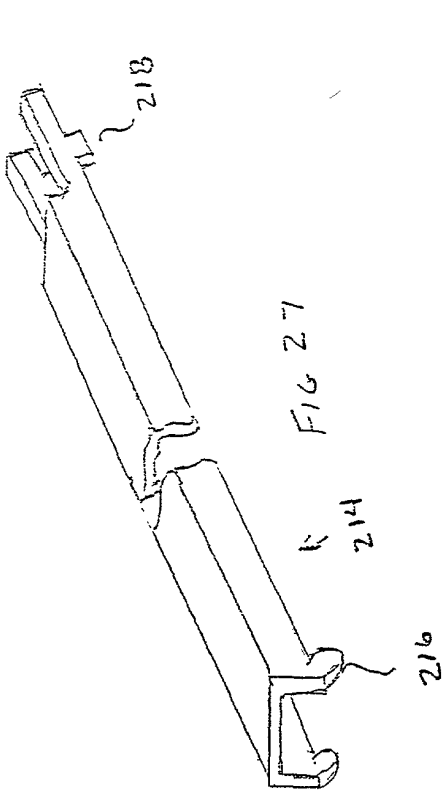
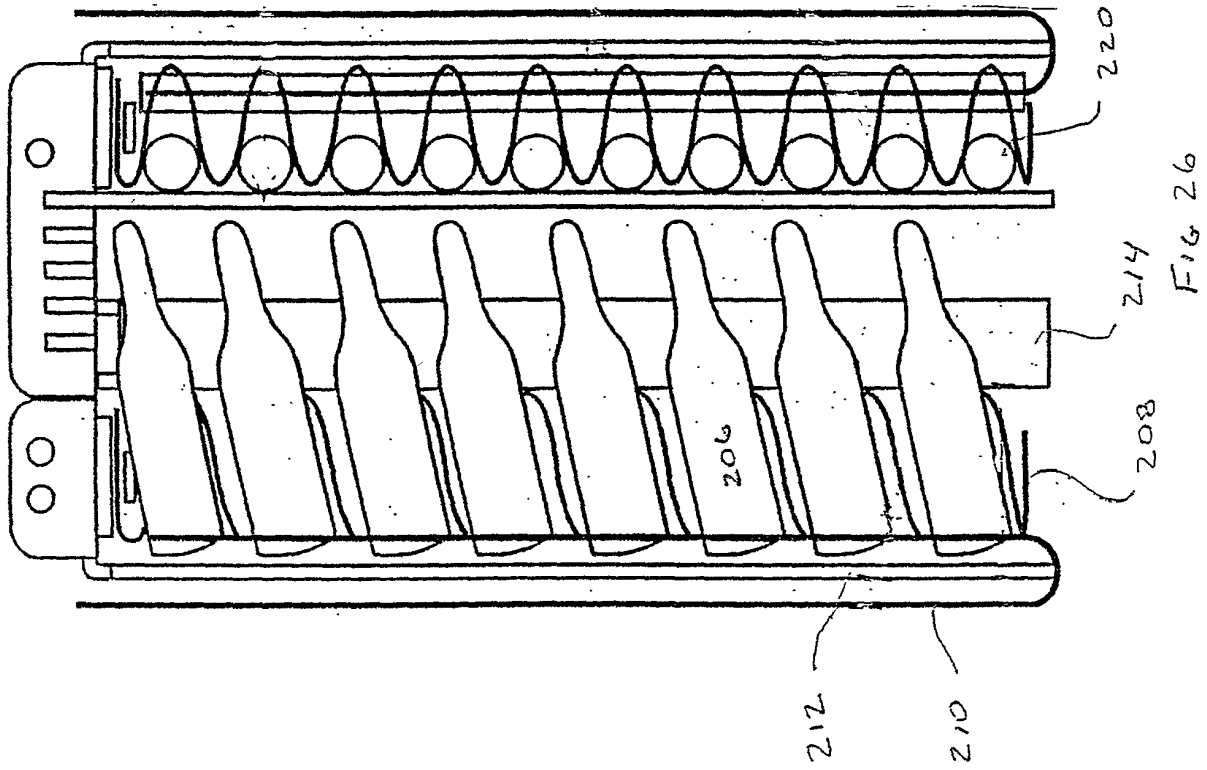


FIG. 25



COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

- ☒ original.
- ☐ design.
- ☐ supplemental.

NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.

- ☐ national stage of PCT.

NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.

- ☐ divisional.
- ☐ continuation.
- ☐ continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: *If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.*

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor *(if only one name is listed below)* or an original, first and joint inventor *(if plural names are listed below)* of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

APPARATUS FOR DISPENSING MEDICAL ITEMS

SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b) or (c))

(a) ☒ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed; or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☐ was filed on _____, as ☐ Serial No. 0 / _____
or ☐ _____
and was amended on _____ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and application number (consisting of the series code and the serial number; e.g., 08/123,456);

"(2) name of inventor(s), serial number and filing date;

"(3) name of inventor(s) and attorney docket number which was on the specification as filed;

"(4) name of inventor(s), title which was on the specification as filed and filing date;

"(5) name of inventor(s), title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(6) name of inventor(s), title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number; e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

Notice of July 13, 1995 (1177 O.G. 60).

(c) ☐ was described and claimed in PCT International Application No. _____, filed on _____ and as amended under PCT Article 19 on _____ (if any).

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

- ☐ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and
- ☐ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119(a)-(d))

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

- (d) ☒ no such applications have been filed.
- (e) ☐ such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>
			<input type="checkbox"/> YES NO <input type="checkbox"/>

CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(34 U.S.C. § 119(e))

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

60 / 045,137
 _____ / EXPRESS MAIL NO. TB830511748US
 _____ / _____

FILING DATE

APRIL 30, 1997

**CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)
UNDER 35 U.S.C. 120**

- ☐ The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART (C-I-P) APPLICATION.

**ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete **ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION** for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

RALPH E. JOCKE

REG. NO. 31,029

(check the following item, if applicable)

- ☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

RALPH E. JOCKE
231 SOUTH BROADWAY
MEDINA, OHIO 44256

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

RALPH E. JOCKE
330-722-5143

DECLARATION

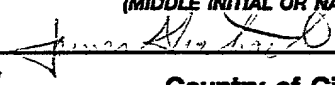
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

(Declaration and Power of Attorney [1-1]—page 5 of 7)


SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

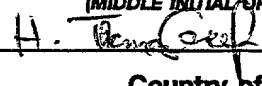
Full name of sole or first inventor

JAMES A. MICHAEL
(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)
Inventor's signature 
Date MAY 7, 1997 Country of Citizenship CANADA
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Full name of second joint inventor, if any

DAVID T. FREDERICK
(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)
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Date MAY 7, 1997 Country of Citizenship U.S.A.
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NORTH HUNTINGTON, PENNSYLVANIA 15642

Full name of third joint inventor, if any

H. THOMAS GRAEF
(GIVEN NAME) (MIDDLE INITIAL OR NAME) FAMILY (OR LAST NAME)
Inventor's signature 
Date MAY 7, 1997 Country of Citizenship U.S.A.
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BOLIVAR, OHIO 44612

(check proper box(es) for any of the following added page(s)
that form a part of this declaration)

- ☐ **Signature** for fourth and subsequent joint inventors. *Number of pages added* _____

* * *

- ☐ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* _____

* * *

- ☐ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* _____

* * *

- ☐ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

* * *

- ☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

☐ Number of pages added _____

* * *

- ☐ Authorization of attorney(s) to accept and follow instructions from representative.

* * *

(if no further pages form a part of this Declaration,
then end this Declaration with this page and check the following item)

- ☒ This declaration ends with this page.